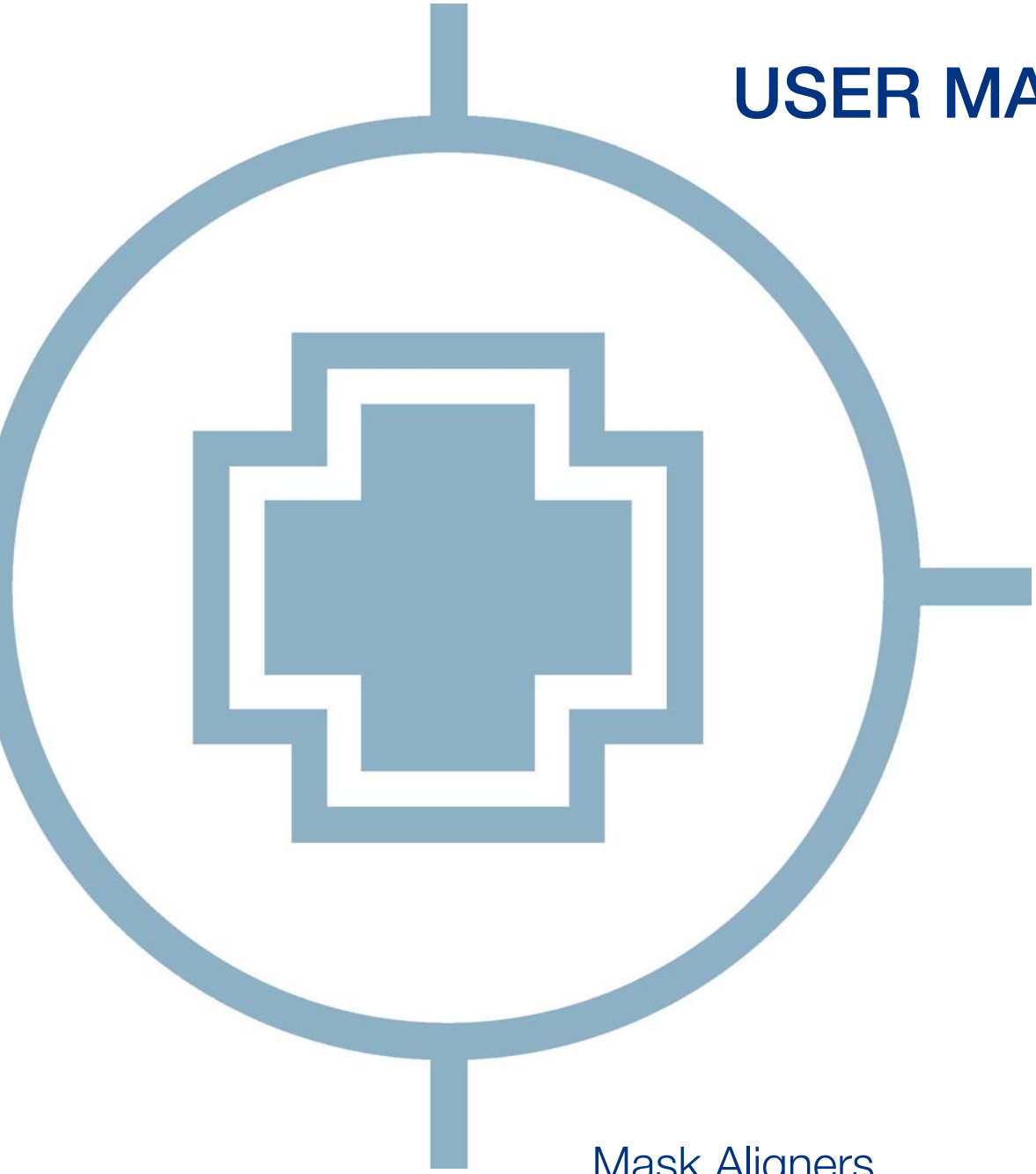
USER MANUAL



Mask Aligners

MA6 / MA8

Manual Mask Aligner

Rev05/ 07-06

www.suss.com

SÜSS MicroTec

Contents

Preface

The SUSS laboratory mask aligners are machines designed for photolithography applications in laboratories and for small-scale production. The MA6 and MA8 machines only differ insignificantly in terms of operation.

Accordingly, the manuals for the mask aligners MA6 and MA8 have also been combined. In this manual, minor differences are given special mention or are described by means of specially identified pictures or sketches. Essentially, the differences relate to:

– machine dimensions, outline and weight
– travel path of the microscscope
– maximum size of the masks and substrates/wafers which are used
– changeover between mask aligner and bond aligner operation
(a detailed description is provided in BA6 Bond Aligner manual)

All of the tooling for the MA6 and MA8, e.g. chucks, mask holders and mask holder adapter frames can be used on both mask aligners. Excepted from this are the BSA chucks for BSA microscopes with split-field magnification. The BSA apertures are approx. 185mm wide in a horizontal direction. This means that these chucks cannot be used on a standard mask aligner with standard BSA microscopes.

Attention !

It is strongly recommended to read this User Manual before starting the Mask Aligner the first time.

1. Operation of the Machine

The SUSS MA6 Mask Aligner is designed for high resolution photolithography in a laboratory for development, small volume production or pilot production environment.

It offers unsurpassed flexibility in the handling of irregularly shaped substrates of varying thickness, as well as standard size wafers up to 150 mm in diameter and substrates up to 6"x 6".

Wafers and substrates up to 6 mm thickness may be processed.

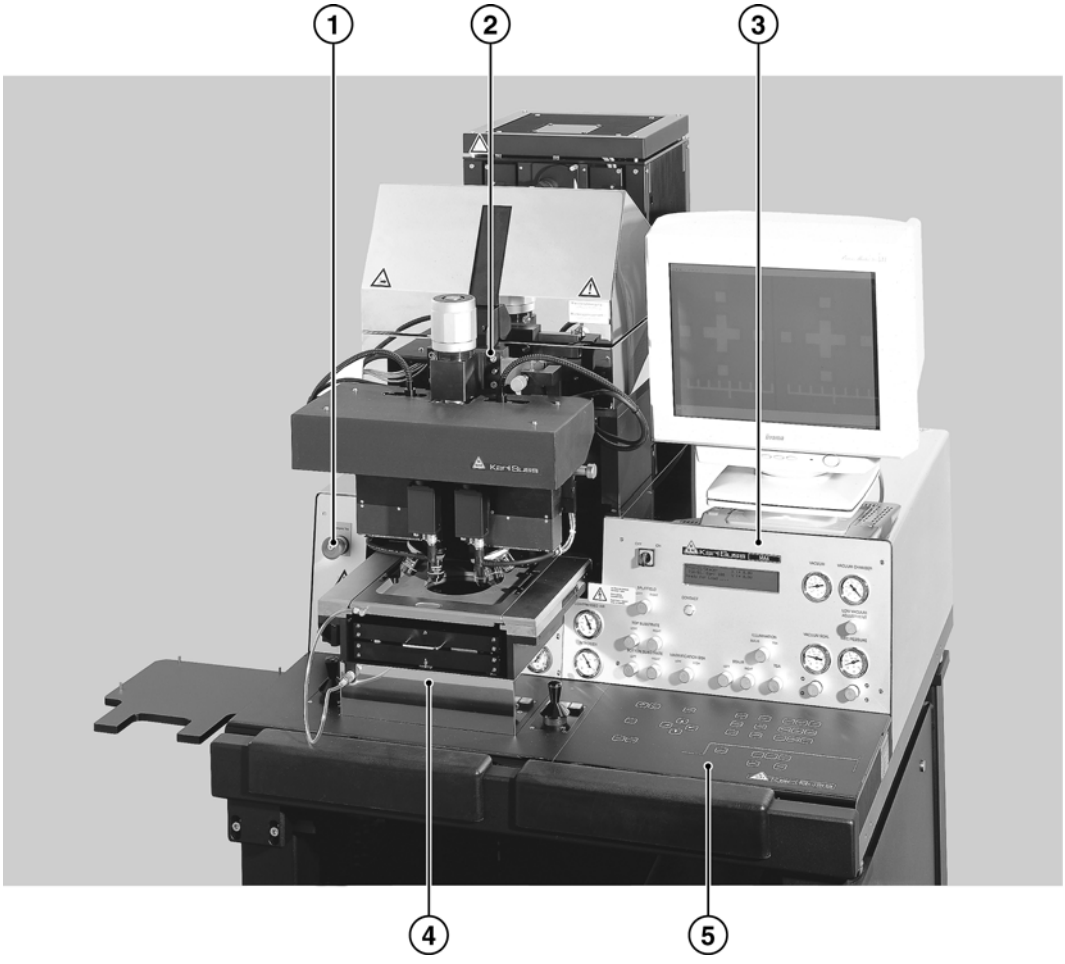
With the modular concept, the MA6 enable easy service. The functional groups are easily accessible and the subassemblies can be quickly exchanged.

The SUSS MA6 represents a new generation of state of the art mask aligners, combining time proven features with newly developed technology for mask aligning wafers, substrates and fractions of it. Based on the proven world wide leader in it's lithography application for more then three decades the SUSS MJB3.

With the SUSS MA6, all contact exposure programs are supplied (vacuum, hard, soft contact and proximity). X- and Y-shift are below 0.1 µm and not detectable by optical means.

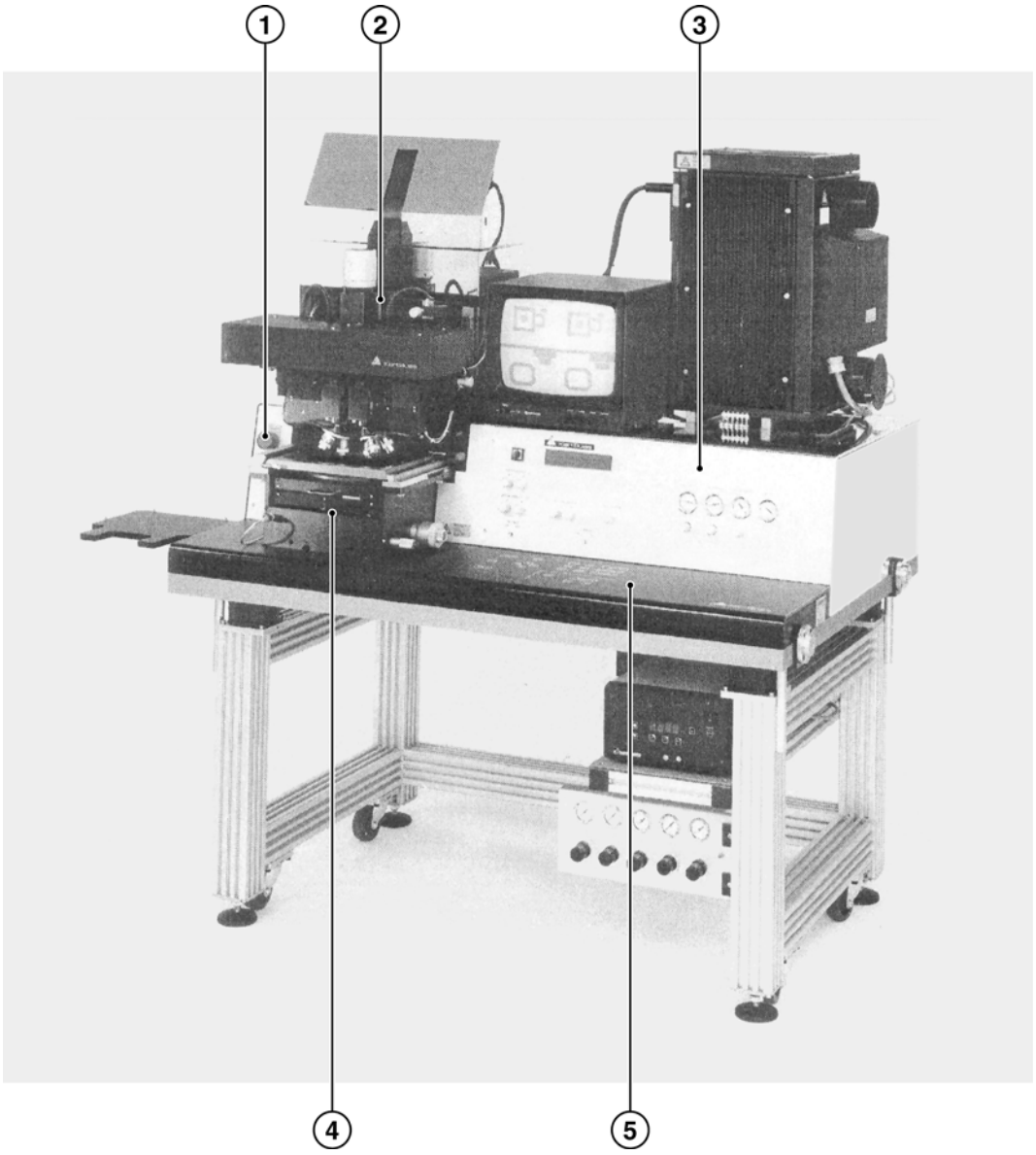
The 400 nm exposure wavelength version is capable of 0.6 µm resolution in vacuum contact. Using 300 nm or 250 nm exposure optics or an excimer laser improves resolution to 0.2 µm.

Various alignment options are available. Top side alignment with a splitfield or a video microscope. Back side alignment with BSA scopes as well as several infrared alignment solutions.



SUSS Mask Aligner MA6

1 EMERGENCY POWER OFF
2 TSA microscope
3 Upper panel control
4 Alignment stage
5 Keyboard



SUSS Mask Aligner MA8

1 EMERGENCY POWER OFF
2 TSA microscope
3 Front panel
4 Alignment stage
5 Keyboard

1.1 Definitions

1.1.1 How to Use this Manual

Start to reading this manual, some rules are applicable. The name of a control function or control indicator is written in capitals. For example:

EDIT PROGRAM

Refers to the key named edit program. Words shown in the display are included in quotation marks. For example:

"move slide into machine and confirm with ENTER"

A warning for the operator of the machine is written cursive. For example:

Watch out for the microscope movement!

Every operator control function and display is referred by a number. The first digit of this is equal to the figure number showing it. For example:

204. VACUUM gauge

This means that the element labeled VACUUM is a gauge explained as item 4 and is displayed in figure 2. This documentation is for using the machine as a mask aligner. The term TOP SUBSTRATE (on which is the upper focus plane) represents the upper substrate during bond alignment and a mask during lithography. The term BOTTOM SUBSTRATE (on which is the lower focus plane) is replaced in the text by the word wafer for bondalignment and lithography.

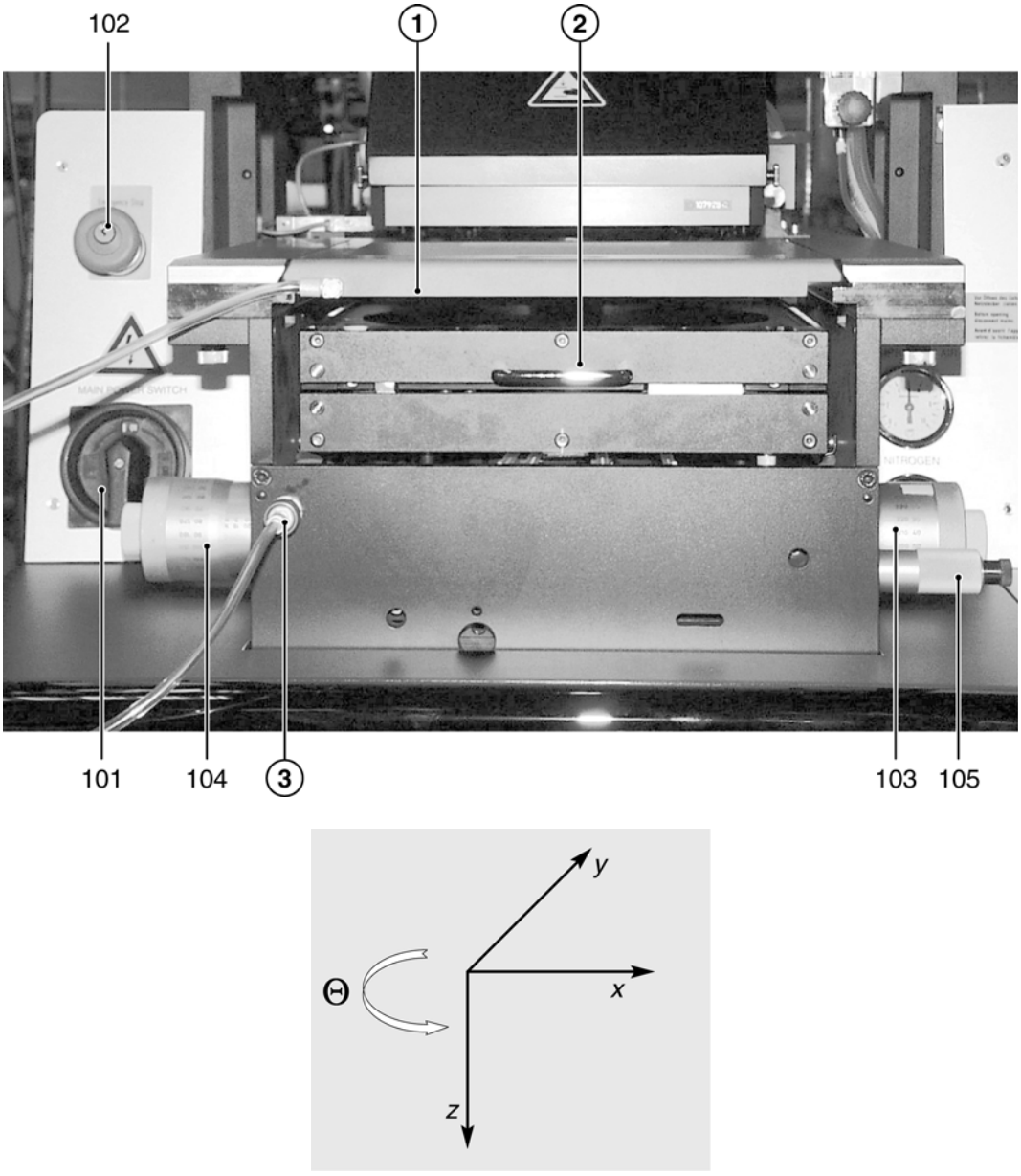
1.1.2 Key LED's

Each key of the keyboard except the ARROW keys is equipped with a light emitting diode, indicating the following:

- LED on:
  key selected or function active
- LED off:
  key not selected or function deactivated
- LED flashing:
  most applicable key to continue

1.1.3 Coordinate Systems

The length units for the x and y-direction are in millimeter. The z-direction length unit is µm. They refer to a coordinate system whose origin is in the center of the alignment stage unit. The origin of the z-axis is equal to the mask plane or upper substrate plane (see Figure 1).



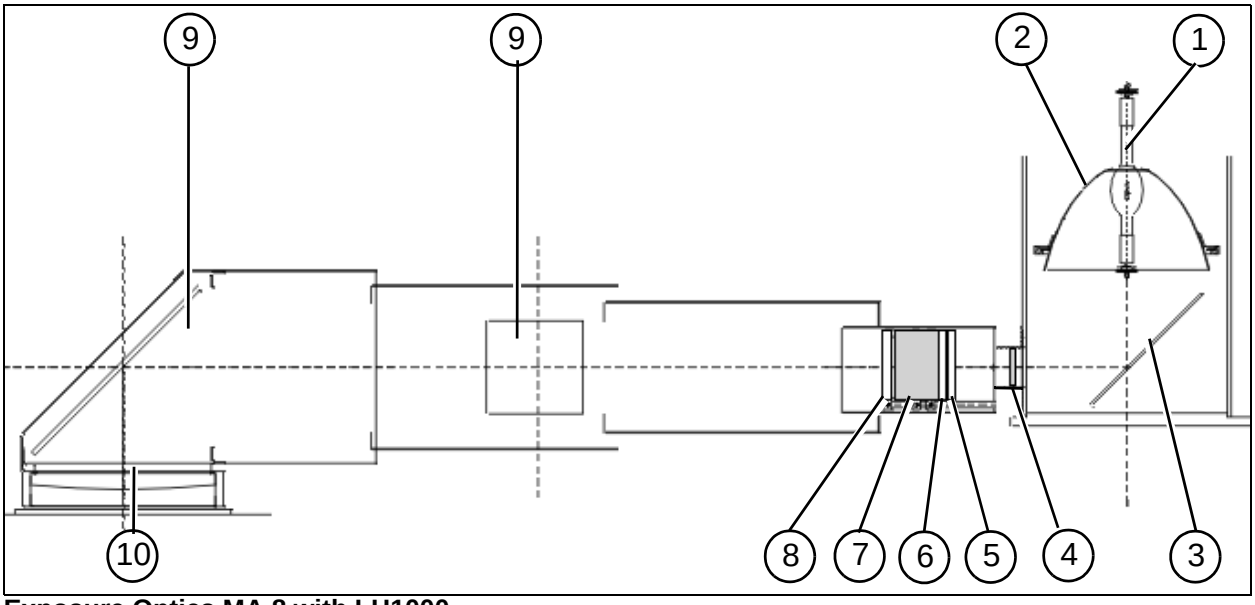
Alignment Stage with Coordinate System

101 MAIN POWER switch
102 EMERGENCY POWER OFF key
103 Knob STG-X-MOVEMENT
104 Knob STG-Y-MOVEMENT
105 Knob STG-Θ-MOVEMENT
1 Mask holder
2 Transport slide
3 Snap in connector mask vacuum

1.1.4 Components of the Exposure Optics

The components of the optical system are depending on the used lamp house system.
The UV400, UV300, and UV250, exposure optics are similar in design. The optical system consists of an exposure lamp, ellipsoidal mirror, cold light mirror
fly's eye lens, condenser lenses, lens plates, turning mirrors and a front lens as shown in the adjacent figure.

The following lamp houses are available:
- LH350
- LH1500/1000
- LH5000



Exposure Optics MA 8 with LH1000

1 Exposure Lamp
2 Ellipsoidal Mirror
3 Cold Light Mirror
4 Fly's Eye Lens or Glass Window
5 Condenser Lens
6 Filter, optional
7 Integrator Block
8 Field Lens
9 Turning Mirror
10 Front Lens

Warning!

UV light can harm eyes and skin.

Work on optical components should be done with the exposure lamp switched off, or at least with closed lamp house shutter. If lighting is essential for adjustment purposes, wear UV protecting goggles and skin protection.

Essential Note!

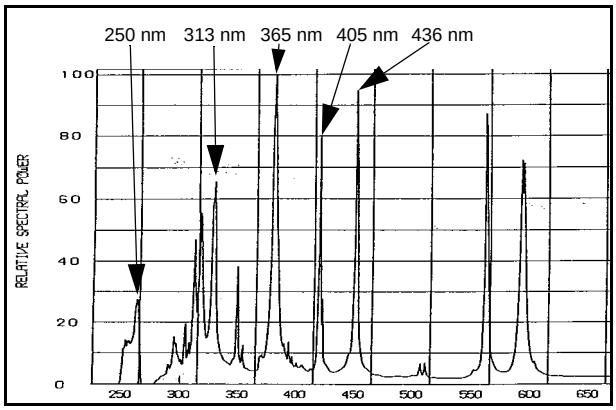
Accurate arrangement of optical components is essential for the quality of exposure.

Modify positions or components only if trained for this job, and when the appropriate adjustment procedure is available.

Also orientation of lenses and the cold light mirror must not be changed.

1.1.4.1 Exposure Lamp

For the UV400 and UV300 exposure optics, the standard exposure lamp is a 1000 W high pressure mercury short-arc lamp in the LH1000.



1.1.4.2 Ellipsoidal Mirror

The exposure lamp is mounted inside an ellipsoidal mirror in a way that the light source is exactly at its first focal point. This mirror collects the radiation emitted by the lamp and focusses it to the second focal point. The ellipsoidal mirror can be the same for all exposure optics. But very hight reflection is available for standard UV400.

1.1.4.3 Cold Light Mirror

The cold light mirror splits the lamp radiation in the not needed long wavelengths and the exposure light. The long wavelengths pass through the mirror and are absorbed by a heat sink. The exposure light (cold light) is reflected 90° to the integrator optics. A selective coating determines the reflected wavelengths. This application range (e.g. UV400) is marked on the mirror as well as the coated face (by the tip of an arrow at the edge).
Because of the selective coating at least the cold light mirror has to be exchanged when ahanging the light application range.

Warning!

Mirror exchange must be done only by trained personnel, who understand all the risks associated with lamp replacement!

1.1.4.4 Fly's Eye Lens

This lens disperses the light and directs it to the condenser lens. The fly's eye lens is made of optical grade fused silica for all optical systems.
Alternatively for more intensity but with less uniformity in the exposure area, a glass window (same material) is available.

1.1.4.5 Condenser Lens

The condenser lens collimates the exposure light. The position of this lens in the mirror house tube affects the intensity and uniformity of the exposure light. A scale is mounted along the optical bench inside the house tube. The position of the condenser lens depends on the type of exposure optics. The condenser lens is made of optical grade fused silica.

1.1.4.6 Filters

The filter is located between the condenser lens and the integrator block. Filters are used to select more specific the exposure wavelength then the cold light mirror can do it or reduce the intensity (broad band intensity filter). All filters are made of quartz glass.

1.1.4.7 Integrator Block

The integrator block has two lens plates with an exactly defined distance to each other. For a good uniformity, each single light channel is super positioned at the exposure plane.The material of the lenses is optical grade fused silica.

1.1.4.8 Field Lens

For best uniformity and a maximum of intensity of the exposure light, the field lens overlays each light channel of the integrator in the exposure plane on each other. The material of the lens is optical grade fused silica.

1.1.4.9 Turning Mirror

It deflects the exposure beam to the exposure area. The coated side of the mirror has to face the beam. Mirrors with dielectric coating are marked with the application range and a sign for the coated surface. Metallized mirrors are broad band mirrors, but not optimized to spectral areas.

1.1.4.10 Front Lens

This lens provides collimation and uniformity of the exposure beam. The lens is specific for each wavelength range. For the UV 400 exposure optics the front lens is fabricated of optical crown glass. UV300 requires quartz glass.

1.1.4.11 Cleaning of Optical Parts

Optical Components can degrade with time by deposition of particles or fumes.
In this case they must be removed from the machine and cleaned very carefully, in order to reconstitute the original quality of the machine.
Optical surfaces are polished and/ or coated. Because of this they are extremely susceptible to mechanical damage. For cleaning they must not be wiped, but only rinsed with liquid solvent.
No other solvent than DI-water (with or without mild detergent) or IPA (Isopropyl alcohol) shall be used. The choice between those depends on the character of contamination. The final cleaning step should always use clear DI. If there is any doubt about the adequate cleaning procedure call SUSS service.

See also instructions in the Maintenance chapter and in the Preventive Maintenance Manual.

Caution!

To avoid damage on optical components, use only recommended solvent and do not wipe.

Place the part back to the identical position in the exposure optics system as before

Warning!

When using IPO protect your skin against contact with the solvent.

IPO is flammable, use it only away from any ignition source. Do not spill IPO.

Used IPO and tissues soaked with IPO must be deposited as flammable waste following local regulations.

For details refer to the host interface documentation delivered separately. This document describes the GEM compliant SECS-II interface for the mentioned equipment. It includes the information required by the SECS-II and GEM standards including the GEM State Models, SECS-II Message Documentation, and other interface details.

1.1.4.12 Deep UV Exposure

Short-wave UV-light (<315nm) has a high biological radiation effectivness and recommended maximum dose for skin and eye exposure is very low.

Extended work in front of a laboratory mask aligner at UV250 or UV300 optics can result in exceeding the dose limit. Therefore it is recommended not to look to the stray light, exiting from the mask stage during exposure and to keep unprotected hands away from the stage during exposure.

Warning!

When using UV250 or UV300 then minimize eye-and skin- exposure from UV stray light by increasing your distance to the stage during exposure times.

SUSS MicroTec could also provide a special stray light barrier to be placed on top of the mask holder frame.

1.2 Controls and Indicators

101 MAIN POWER switch

This connects the machine to the public power station for electricity.

102 EMERGENCY POWER OFF key

In any case of danger press this button to disconnect the machine from the public power line.

1.2.1 Alignment Stage Controls

103 Knob STG-X-MOVEMENT

This is located at the right side of the alignment stage and moves the wafer in x-direction. Maximal travel ±10mm.

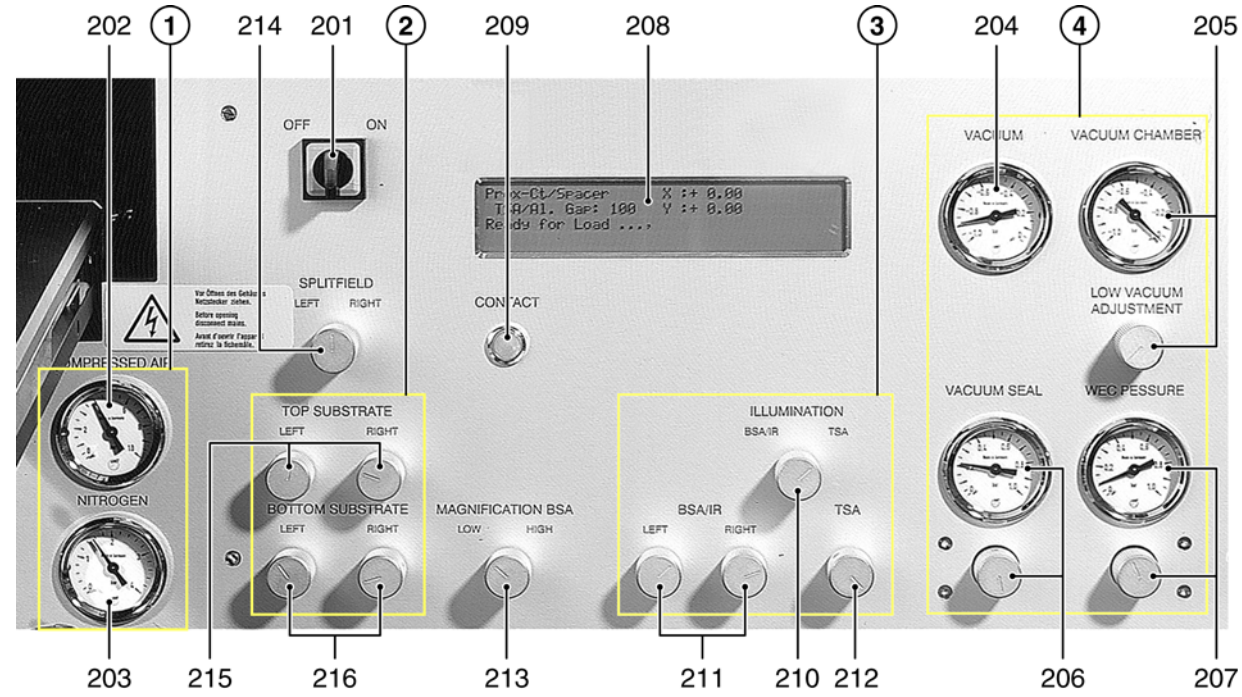
104 Knob STG-Y-MOVEMENT

This is located at the left side of the alignment stage and moves the wafer in y-direction. Maximal travel ±5mm.

105 Knob STG-Θ-MOVEMENT

This is the small knob at the right side of the alignment stage. Maximal travel ±5°.

1.2.2 Front Panel Controls



Front panel

Note
Controls of MA8 Front Panel are identical except their position.

201 POWER SWITCH ELECTRONIC

1 Pressure
202 COMPRESSED AIR gauge
203 NITROGEN gauge

4 Vacuum
204 VACUUM gauge
205 VACUUM CHAMBER gauge (with regulator)
206 VACUUM SEAL (with regulator)
207 WEC - PRESSURE gauge (with regulator)

208 LCD-display
209 CONTACT indicator

3 Illumination
210 ILLUMINATION switch
211 BSA/IR microscope illumination
212 TSA microscope illumination
213 MAGNIFICATION BSA switch
214 SPLITFIELD switch

2 Substrate
215 TOP SUBSTRATE LEFT/RIGHT
216 BOTTOM SUBSTRATE LEFT/RIGHT

322 BSA MICROSCOPE key
323 LEFT key
324 BOTH key
325 RIGHT key
326 TOP/BOTTOM key

201 POWER SWITCH ELECTRONIC

Start the MA6 by turning the switch shortly clockwise to ON and release. Stop the MA6 also by turning the switch shortly clockwise to OFF and release.

202 COMPRESSED AIR gauge

The machine operates properly when the pressure is set to 5 bar. The air pressure is controlled by a regulator adjusted by a service engineer.

203 NITROGEN gauge

N_2 gas is used to cool the exposure lamp, establish a nitrogen "pillow" under the wafer (hard contact exposure), purge the wafer exposure area, and to break residual vacuum after vacuum contact and other secondary functions. At 1 bar N_2 (adjusted by a service engineer) the machine operates properly.

204 VACUUM gauge

The vacuum supplied to the machine should be -0.8 bar related to normal air pressure what means 0.2 bar absolute pressure.

205 VACUUM CHAMBER gauge (with regulator)

The gauge indicates the vacuum level in the vacuum chamber during exposure. The vacuum level is adjusted opening a N_2 leak valve. Open the vacuum restrictor LOW VACUUM ADJUSTMENT below the gauge counter clockwise. Close it by turning the knob clockwise.

206 VACUUM SEAL (with regulator)

The required pressure to inflate the rubber lip (necessary to create the vacuum chamber) should be set to a value p = 0.1 to 0.2 bar for standard thickness wafer according SEMI specification. Thicker wafer might need a slightly higher pressure. A improper high pressure could create an overcurrent error.

207 WEC - PRESSURE gauge (with regulator)

To perform the wedge error compensation the wafer must be pressed with a defined force against the mask. The WEC-pressure is used to compensate the higher gravitation force of a bigger chuck. The WEC-pressure also must be changed proportional to a change of the wafer area. The air pressure for the WEC-head can be set in accordance with your process requirements (range 0.2 and 1.0 bar). This is done with the corresponding regulator below the gauge.

208 LCD-display

This user interface displays instructions, confirmations and other messages.

209 CONTACT indicator

That lamp lights whenever mask and wafer or two wafers for bond alignment are in contact. If you move the wafer manually further up, this indicator starts flashing.

210 ILLUMINATION switch

The illumination is supplied either to the TSA or BSA microscope by way of fiber optic light cables from a light source. BSA illumination is selected in the BSA/IR position.

211 BSA/IR microscope illumination

The potentiometers labeled LEFT and RIGHT realize the fine illumination adjustment for the two objectives of the BSA microscope (BSA/IR is selected).

212 TSA microscope illumination

The fine illumination adjustment is performed with the TSA adjustment knob. For the coarse adjustment use control 501 (see chapter 3.2.5 Lamp house controls).

213 MAGNIFICATION BSA switch

Select between low and high magnification.

214 SPLITFIELD switch

With the rotary switch in middle position, the left/right objective image is shown on the left/right half side of the video monitor simultaneously. With the switch in right or left position, the right/left objective image is displayed on the whole video monitor. Only for the microscope type M3xx this switch must be in left position and the splitfield must be selected at the microscope itself.

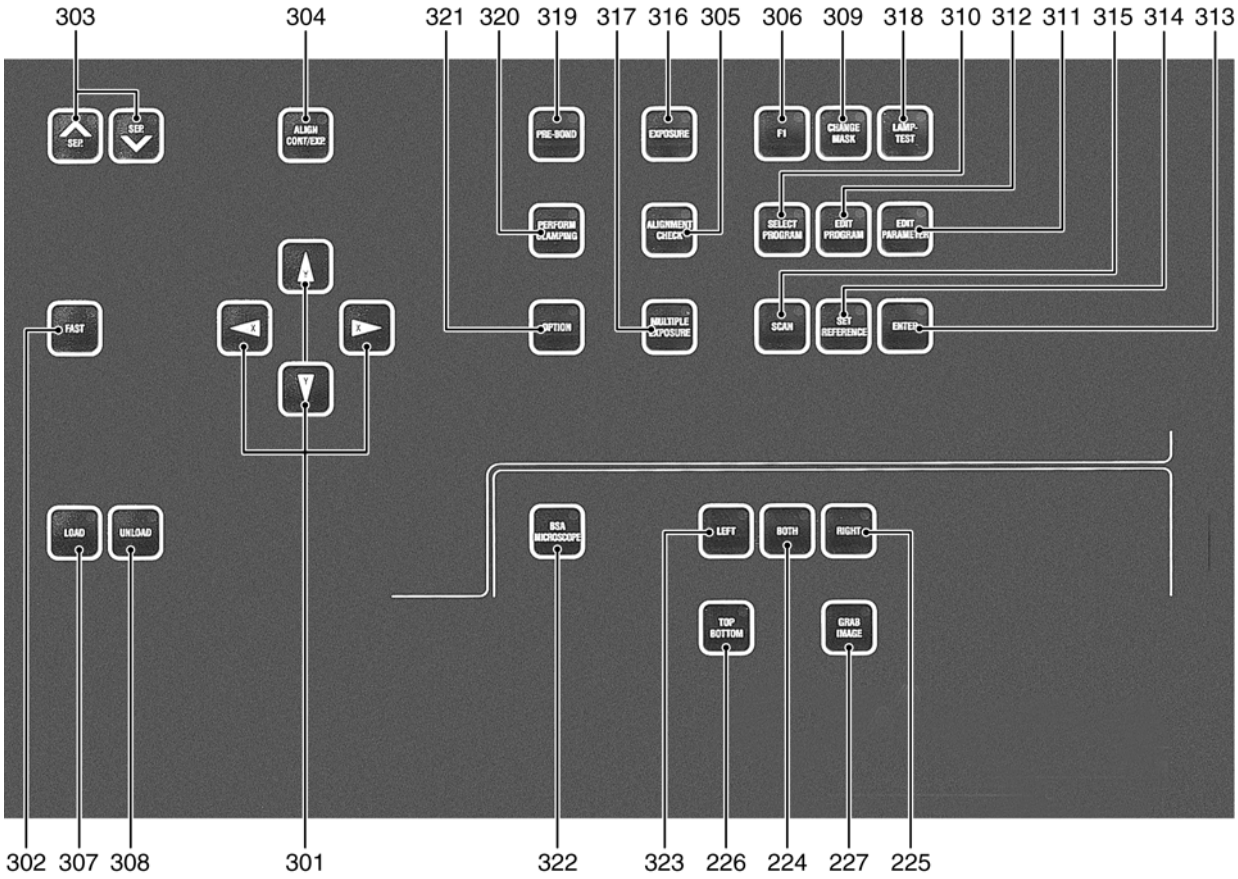
215 TOP SUBSTRATE LEFT/RIGHT

In order to improve the image of the mask structures displayed on the video monitor only minor focus adjustments are necessary. The two potentiometers individually control the fine focus of the BSA and TSA microscope objectives at the upper focus plane.

216 BOTTOM SUBSTRATE LEFT/RIGHT

In order to improve the image of the wafer structures displayed on the video monitor only minor focus adjustments are necessary. The two potentiometers individually control the fine focus of the BSA and TSA microscope objectives at the lower focus plane.

1.2.3 Keyboard Controls



Keyboard

301 X, Y-ARROW keys
302 FAST key
303 SEP keys
304 ALIGN CONT/EXP key
305 ALIGNMENT CHECK key
306 F1 key
307 LOAD key
308 UNLOAD key
309 CHANGE MASK key
310 SELECT PROGRAM key
311 EDIT PARAMETER key
312 EDIT PROGRAM key
313 ENTER key
314 SET REFERENCE key
315 SCAN key
316 EXPOSURE key
317 Multiple Exposure key
318 LAMP TEST key
319 PRE-BOND key
320 PERFORM CLAMPING key
321 OPTION key
322 BSA MICROSCOPE key
323 LEFT key
324 BOTH key
325 RIGHT key
326 TOP/BOTTOM key
327 GRAB IMAGE key

301 X, Y-ARROW keys

The function of these keys depends on the task performed:

- movement of the upper microscope (TSA)
- movement of the lower microscope(BSA)
- movement of the wafer (only motorized stage) (STG)
- selection of next/last parameter in the control software (X-arrows)
- change of parameter values (Y-arrows)

Arrow keys marked with X are labeled with an triangle pointing to the right/left. To move the manipulators along the X-axis press one of this keys. Arrow keys marked with Y are labeled with an triangle pointing upward/downward. To move the manipulators along the Y-axis press one of this keys. In case the manipulator reaches one/both limit positions along the X- and/or Y-axis, the message on the monitor indicates:

"HW or SW limits active - use ARROW keys"

to move back into regular range use the key for the opposite direction.

302 FAST key

Activating this key (LED is ON) enables the movement of the microscope manipulator and motorized stage if existing into the desired direction with the fast speed (otherwise the movement is performed with the slow speed). The speed level can be adjusted with function F1 - change align speed (see explanations to key F1).

303 SEP keys

The keys are labeled with an arrow pointing upward and downward and marked with SEP (separation). With these keys the alignment position of the wafer can be changed in steps of 1 µm along the z-axis. The keys are active after WEC. Moving to mask contact the CONTACT indicator lights on. Further moving the wafer up this indicator flashes.

If mask and wafer are in contact (CONTACT INDICATOR on), don't align the wafer!

304 ALIGN CONT/EXP key

Acts as a toggle switch. The operator can quickly change the position of the wafer between alignment gap and exposure position relative to the mask.

If mask and wafer are in contact (CONTACT INDICATOR on), don't align the wafer!

305 ALIGNMENT CHECK key

With this key one can check the alignment prior exposure. Particles between mask and wafer or the edge bead can affect the alignment of the wafer to the mask. To test that the alignment remains stable while moving to exposure position, all parameters of the exposure program are triggered except the exposure itself. This key is active for the exposure programs: Vacuum Contact, Low Vacuum Contact, and Hard Contact. For example: starting the exposure program "Vacuum Contact" triggers the pneumatic procedures:

Pre Vac and Full Vac:

To check the possible influence of these unexpected factors before exposure, press the ALIGNMENT CHECK key. Press this key again to release the wafer back into alignment gap.

If mask and wafer are in contact (CONTACT INDICATOR on), don't align the wafer!

306 F1 key

If one wishes to leave the variable unchanged, simply press the flashing F1 key.

The different functions of F1 key are:

- Microscope up/down
  During loading, aligning and exposure the microscope does all necessary up and down movements automatically. For a better view to mask and wafer this is manually possible by using the F1 key.
- Change alignment speed
  The user can select between slow and fast alignment speed by the FAST key. The speed selected by the FAST key (fast or slow) will be displayed here. Select the desired alignment speed for the microscopes and motorized stage (if existing). The Y-ARROW keys change the parameter value, the X-ARROW keys toggle between the TSA, BSA and STG parameter. Pressing the FAST key enables the adjustment of the other speed parameter (see also 3.5.4 Changing the TSA, BSA and stage alignment speed).
- Single step config
  Define the step width for the alignment stage movement per each depression of a arrow key.
- Centering stage
  For every WEC procedure the alignment stage move to the center position for x, y and Θ. Centering stage on (default) means, the wafer goes to alignment gap keeping this center position. Centering stage off means, the alignment stage move

to the X-, Y- and Θ-position used during the previous alignment at time of EXPOSURE key activation. In case a prior saved program contains this position values, it will be activated.

– Select maskloading
  The two options for the loading process are:
  - load manually (default)
  - load by slide

For Load by slide it's possible to select between:

- without alignment of the mask (no align)
- with BSA alignment of the mask (BSA align)

Both loading procedures are described separately (see chapters 3.3.2 First mask print mode and 3.5.8 Load mask by slide).

– Scope synchron.
  Infrared light is used to look through Wafer which are opaque for visible light. The light is locally supplied using the BSA microscope arms. The TSA microscope is used as a transmitted light microscope. Synchronous movement of TSA and BSA microscope is necessary. To enable this, deactivate the BSA MICROSCOPE key. Switch the ILLUMINATION switch (210) to BSR/IR and (if existing) the IR switch on. Adjust the TSA-objectives by the OBJECTIVE X-SEPARATION knobs (405) to the location of the IR-light supply. The synchronous scope movement is only possible by the arrow keys.
– Single BSA al.
  Use this special function to align substrates which alignment mark distance is smaller then the minimum distance of the BSA objectives. For this case use only one objective in connection with the SET REFERENCE key and SCAN key. For detailed instructions read chapter 3.3.5.
– WEC-delay
  A large wafer needs longer time to set itself exactly parallel to the mask. This is necessary to get high quality mask prints of small structures over the whole wafer. The necessary time must be tested and set by the operator.

307 LOAD key

After the machine has been powered on, the LED of the LOAD key is flashing. Hit the LOAD key to finalize the boot procedure.

Press the LOAD key to start the wafer loading procedure.

308 UNLOAD key

If one wishes to unload the wafer, press this key. This key also terminates some working sequences. Pressing UNLOAD after starting the exposure cycle the exposure sequence will be completed without exposure itself.

309 CHANGE MASK key

Starting from the initial screen the operator initiates the procedure for changing (loading/unloading) of the mask.

Unload the mask before powering off the machine!

310 SELECT PROGRAM key

Select one of the six exposure programs of the machine (see also chapter 3.5.2).

311 EDIT PARAMETER key

After the desired exposure program has been selected, press the EDIT PARAMETER key. Edit the parameter of the exposure program. The parameter is changed with the corresponding Y-directional arrow key. The next parameter is selected by the X-directional arrow key. The number of parameters depends on the selected exposure program (see also chapter 3.5.3).

312 EDIT PROGRAM key

This key enables the operator to assign all parameter settings and the microscope position to a program number ranging from [0] to [99]. This number helps to keep all settings in the nonvolatile memory (see also chapter 3.5.5):

– save
  after exposure program selection and the parameter adjustment, press the EDIT PROGRAM key and toggle to "save" using the x-ARROW keys. Assign a program number using the y-ARROW-keys. Press ENTER key to save it. A former saved program to this number will be overwritten.
– load
  press the EDIT PROGRAM key and toggle to "load". Select a program number to load a former saved program. Press ENTER key to load it.
– delete
  press the EDIT PROGRAM key and toggle to "delete". Select a program number to delete. Delete the displayed program.

313 ENTER key

Press the ENTER key to confirm an action whenever the program prompts you to do so.

314 SET REFERENCE key

The SET REFERENCE key enables the operator to store the actual microscope position of the TSA or BSA microscope as reference position. This is necessary for the SCAN key function. This can be used also for the alignment stage.

315 SCAN key

This key can be used only after a reference position for the selected microscope with the SET REFERENCE key is stored (i.e. the position for the first alignment mark). Then the microscope can be moved to a new position (i.e. the position for the second alignment mark). Activating the SCAN key toggle the position of the microscope between the current position and the reference position. This can be used also for the alignment stage.

316 EXPOSURE key

This key starts the active exposure program after an alignment or in first mask print mode.

317 Multiple Exposure key

It is possible to split the exposure in several intervals. The key must be activated for this (LED on). See also chapter 3.4.2.

318 LAMP TEST key

Pressing this key moves the mirror house forward and open the light shutter. Exposure intensity and uniformity adjustment is possible. Deactivating this key finish this task.

319 PRE-BOND key

Enabled only in the bond-aligner-mode: this moves the wafers together and the vacuum sequence starts.

320 PERFORM CLAMPING key

Enabled only in the bond-aligner-mode: this clamps the wafers together with or without spacers.

321 OPTION key

The X-ARROW keys controls the Θ-movement for the motorized alignment stage when OPTION key is activated.

322 BSA MICROSCOPE key

Toggles the motor control and image processing between TSA (LED off) and BSA (LED on) microscopes.

323 LEFT key

For BSA alignment only the movement of the left objective is possible.

324 BOTH key

The simultaneous movement of both BSA-objectives is possible.

325 RIGHT key

For BSA alignment only the movement of the right objective is possible.

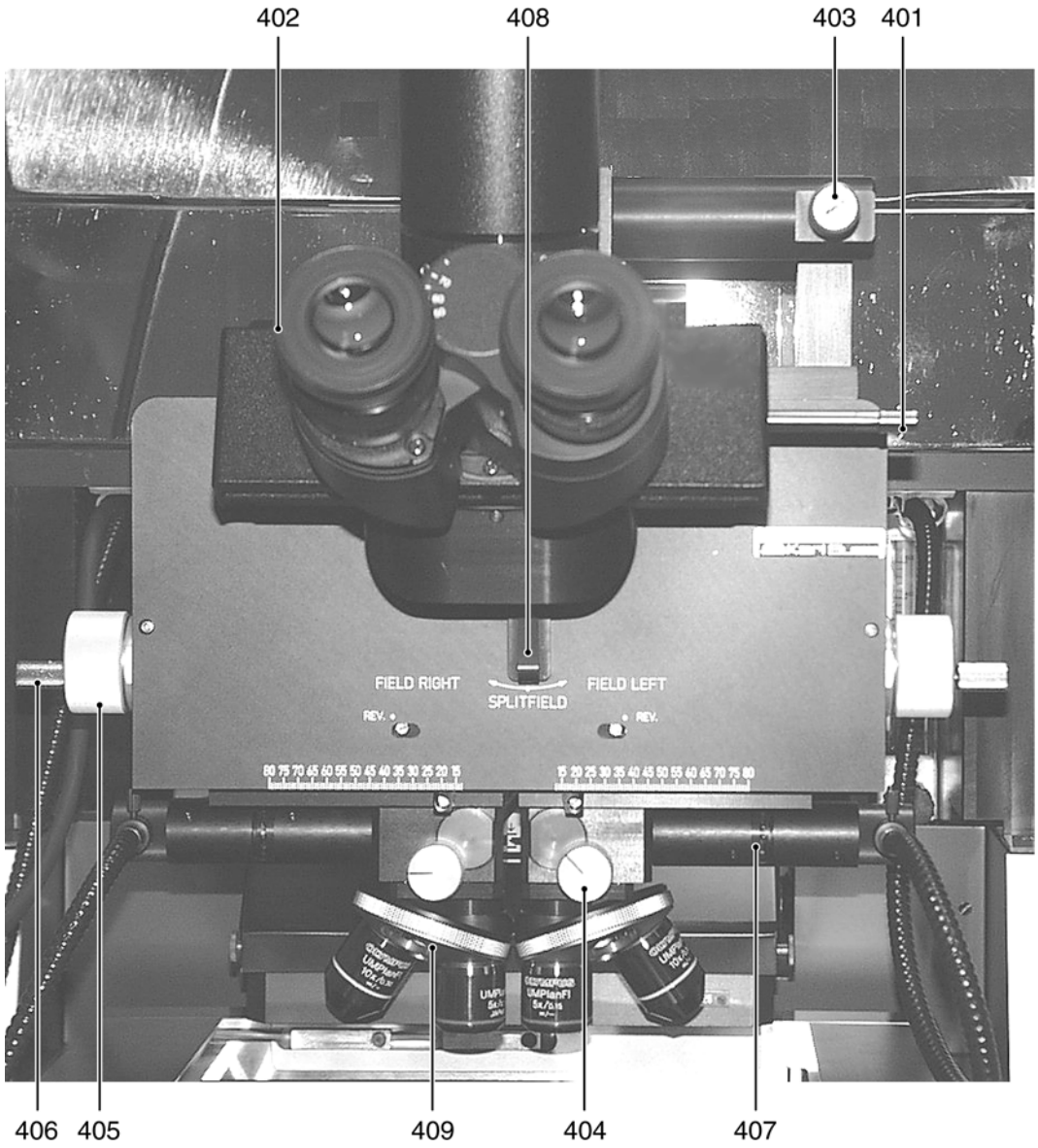
326 TOP/BOTTOM key

Toggle the focus plane between mask plane (LED on) and wafer plane.

327 GRAB IMAGE key

By activating this key the current monitor image is stored as background image to be superimposed with the wafer image later on.

1.2.4 TSA-Microscope Controls



TSA-Microscope M 336

401 BEAM SPLITTER TSA
402 TSA Z-MOVEMENT knob
403 TSA Θ-MOVEMENT knob
404 OBJECTIVE FOCUS FINE MANUAL knob
405 OBJECTIVE X-SEPARATION knobs
406 CLAMPING SCREW
407 APERTURE TSA-Illumination
408 TSA SPLITFIELD switch
409 Turret

1.2.4.1 M 3xx Microscope

Before using the microscope make secure the TSA illumination (control 210) is on and the BSA MICROSCOPE key is off. Turn the SPLITFIELD switch (control 214) on the front panel to left to get the TSA image on the monitor.

401 BEAM SPLITTER TSA

This slide on right side of the microscope tube guide the beam to the eyepieces, the monitor or both.

402 TSA Z-MOVEMENT knob

The fine movement works at any position in a range less than on turn and with a low torque. Continuing rotation increases the torque and enables the coarse adjustment.

403 TSA Θ-MOVEMENT knob

Rotates the microscopes around the z-axis by turning the knob located in the upper right TSA microscope front.

404 OBJECTIVE FOCUS FINE MANUAL knob

For the M 3xx without motorized focus, fine focus of the left/right objective is possible by the left/right knobs only.

405 OBJECTIVE X-SEPARATION knobs

The right/left objective can move independently in x-direction by the big knobs located in the right/left side of the TSA microscope body. Never turn this screw when the CLAMPING SCREW is fixed.

406 CLAMPING SCREW

This has two functions. First it acts as a crank. Second it is used to clamp a certain objective position. Press that knob gentle toward the microscope body and turn clockwise. To release turn in the opposite direction until it snaps out.

407 APERTURE TSA-Illumination

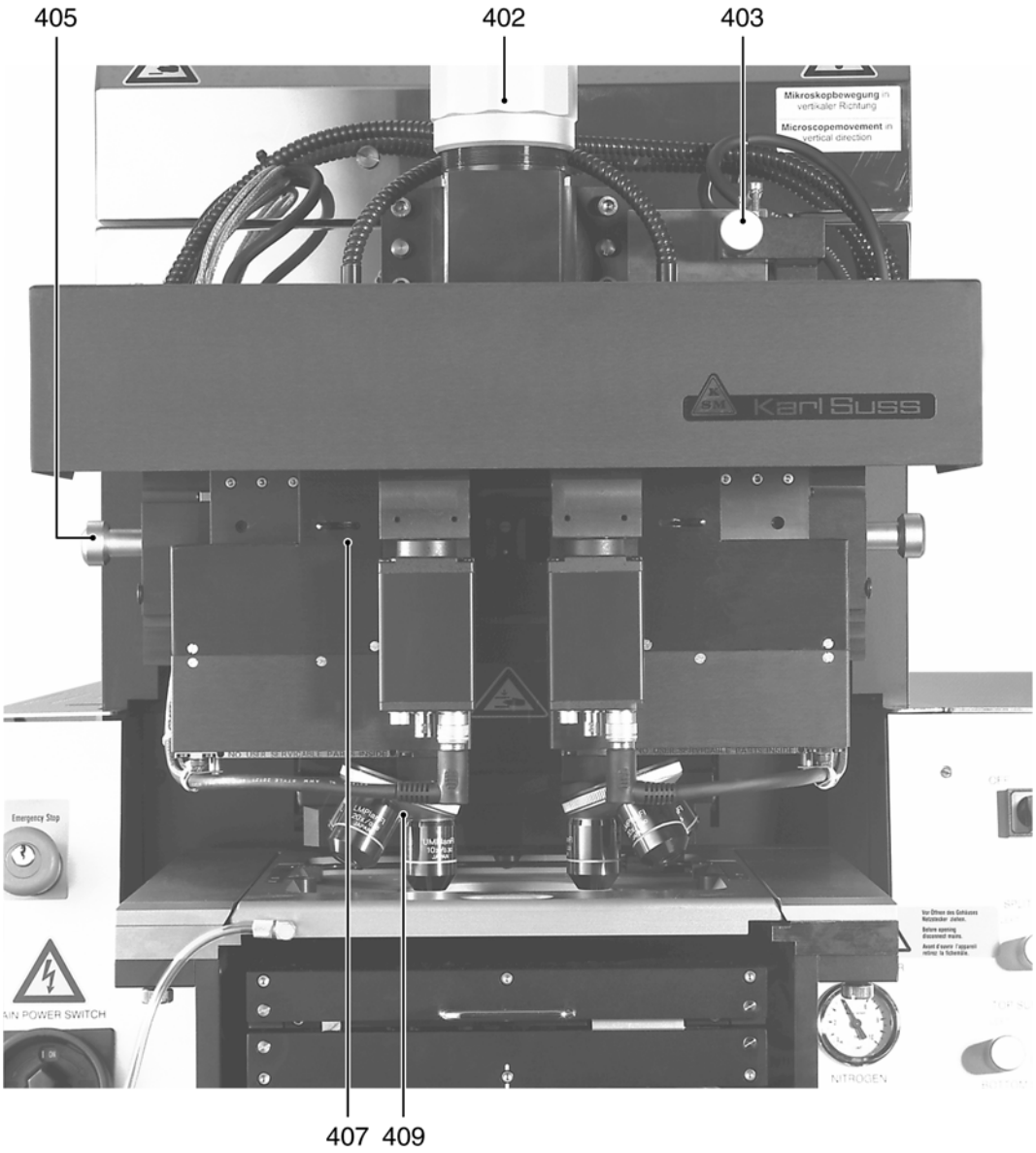
This right/left aperture at TSA-microscope front adjusts the illumination for the right/left TSA-objective separately.

408 TSA SPLITFIELD switch

Located on the microscope front this switch selects the left, right or both TSA-objective as source for the eyepieces and monitor image.

409 Turret

Turn the knurled ring to move another objective in the beam.



Dual Video Microscope DVM 6

402 TSA Z-MOVEMENT Knob
403 TSA Θ-MOVEMENT knob
405 OBJECTIVE X-SEPARATION knobs
407 APERTURE TSA-Illumination
409 Turret

1.2.4.2 Dual Video Microscope DVM 6/8

Before using the microscope make secure the ILLUMINATION TSA (210) is on and the BSA MICROSCOPE key is off.

401 BEAM SPLITTER TSA

On this microscope not necessary.

402 TSA Z-MOVEMENT Knob

Turn this big knob to focus the microscope coarse.

403 TSA Θ-MOVEMENT knob

Rotates the microscopes around the z-axis by turning the knob located in the upper right TSA microscope front.

404 OBJECTIVE FOCUS FINE MANUAL knob

This is a motorized focus here.

405 OBJECTIVE X-SEPARATION knobs

The right/left objective can move independently in x-direction by the big knobs located in the right/left side of the TSA microscope body.

406 CLAMPING SCREW

Does not exist at this microscope.

407 APERTURE TSA-Illumination

This right/left aperture at TSA-microscope front adjusts the illumination for the right/left TSA-objective separately.

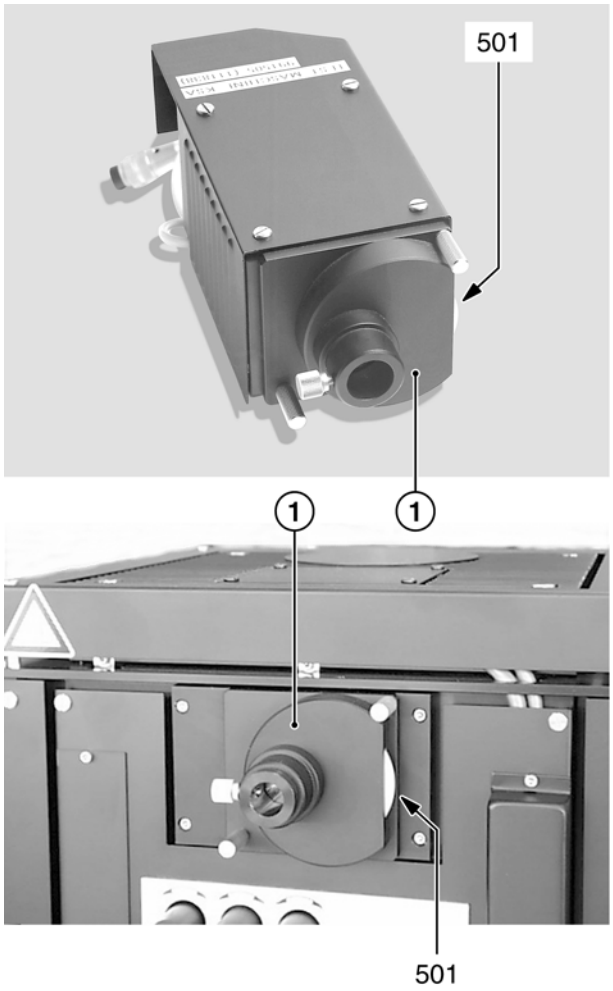
408 TSA SPLITFIELD switch

This function is electronically realized. See the manual for the corresponding image processing system.

409 Turret

Turn the knurled ring to move another objective into the beam.

1.2.5 Lamp House Controls



Lamp house LH 350 and LH 1000

501 Illumination adjustment coarse
1 Thumb wheel housing

501 ILLUMINATION ADJUSTMENT COARSE

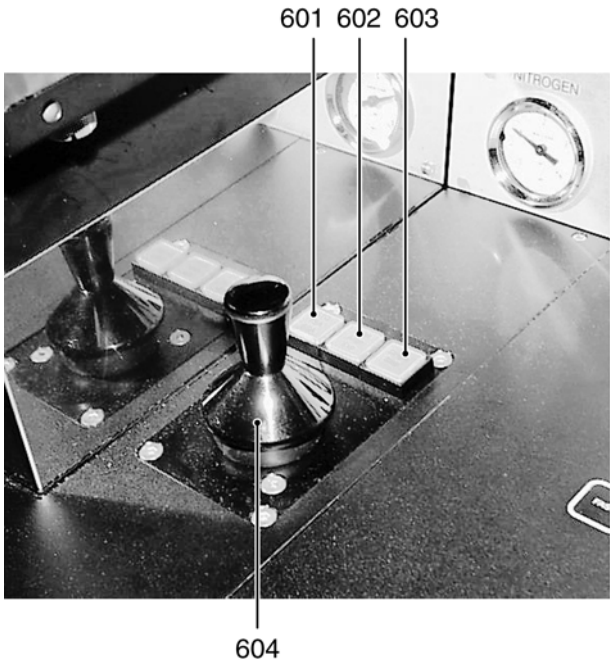
For a coarse adjustment of the light intensity turn the thumb wheel at the microscope light source. Turn clockwise / counterclockwise to open/close the aperture. The big thumb wheel ILLUMINATION ADJUSTMENT COARSE (501) has a diameter of nearly 5 cm, 0.5 cm thick.

For the lamphouse LH 350 find the adjustment wheel behind the lamp house. It might be necessary to remove the left stainless steel cover of the lamphouse to have access to the microscope illumination.

For the lamphouse LH 1000 find the adjustment wheel on the upper front side of the lamphouse. Lamp exchanging is possible opening the two knurled screws.

1.2.6 Joystick and Buttons

(motorized stage only)



Joystick keys

601 STG/TSA/BSA button
602 CONT/ALIGN/EXP button
603 SINGLE STEP button
604 X-Y-JOYSTICK

601 STG/TSA/BSA button

- Illuminated:
  Joystick and arrow keys controls the alignment stage motors.
- Dark:
  Joystick and arrow keys control the TSA or BSA motors depending on the status of the BSA MICROSCOPE key (see 322).

602 CONT/ALIGN/EXP button

The wafer is in alignment position if this button is activated, otherwise the wafer is in exposure position.

603 SINGLE STEP button

Every joystick flexure or arrow key depression will only result in a single step movement in accordance with the value programmed via the F1 key.

604 X-Y-JOYSTICK

Flexure the joystick located on the right side of the alignment stage in this direction in which the microscope/alignment stage should move. Release if final position is reached. The movement speed increase by a stronger joystick flexure. Activating FAST key allows fast movement.

605 Θ-JOYSTICK (alignment stage only)

This joystick is located at the left side of the alignment stage. Flexure in x-direction rotates the wafer in fast speed clockwise or back. Flexure in y-direction rotates the wafer in slow speed clockwise or back.

1.3 Operating Procedures

A condensed step by step operation instruction is described in chapter 3.5 Step by step machine interactions.

1.3.1 Power on Procedure

A. Before powering on the machine check or adjust

- Compressed Air: 5 bar
- Nitrogen: 1 bar
- Vacuum. The gauge should read -0.8 bar

Turn the MAIN POWER switch (on left side of alignment stage) to the ON position.

B. Ignition of the exposure lamp (CIC 1200)

POWER SWITCH ELECTRONIC of the machine should be OFF. Switch on power of the Constant Intensity Controller (CIC). The software version is shown in the display. The CIC performs a self calibration test and displays "ready". Press CP (constant power) key. Display shows "wait", followed by "Start". Press START key. This will ignite the exposure lamp. LED LAMP LIFE/POWER is flashing until lamp warming up is finished. For more detailed information use the CIC-manual.

Attention! Nitrogen failure for longer then 5 minutes will turn off the exposure lamp!

C. Starting the machine

Shortly turn the POWER SWITCH ELECTRONIC (201) on the frontpanel clockwise into ON position and release. Machine initialize. An example for the display message is:

"Ready for Start - press LOAD Button MA6-BA6-[M] V 4.000 04.05.01 SW:P"

The meaning of the second displayed line is:

configuration software version date included options (here: purge)

Press the flashing LOAD key on the keyboard.

"Watch out machine is starting!"

Now you are asked for:

"Select machine configuration: MA6"

Select between mask align- (MA6) and bond align- (BA6) operation mode (with the Y-ARROW keys). After this selection the software is loaded and the machine is in a initial state, ready for operate and displays:

"Ready for load"

All motorized manipulators (TSA, BSA and alignment stage) are set to the position used before the machine was powered off. For your information: if you need a software reset, press the key combination FAST - UNLOAD (nearly 200ms time distance). Keep the EDIT PARAMETER key (311) pressed down while power on the POWER SWITCH ELECTRONIC (201) overwrites all parameter settings with the default values from the EPROM. Power off the machine by turning the POWER SWITCH ELECTRONIC (201) on the front panel counterclockwise into OFF position and release.

1.3.2 First Mask Print Mode

The first mask print of a wafer is done without alignment. This software sequence is started by the EXPOSURE key. Starting from the initial state of the machine this steps has to be performed:

1. Adjust Parameters

- select mask loading type: F1 key
  Make secure that no mask is loaded before select mask loading type.
- select exposure mode: SELECT PROGRAM key
  Press SELECT PROGRAM key (310). Toggle through the menu and confirm your exposure program by pressing SELECT PROGRAM key again.
- edit parameters: EDIT PARAMETER key
  Press EDIT PARAMETER key (311) to edit the parameter. Change all necessary value and confirm by pressing EDIT PARAMETER key again.
- save all settings: EDIT PROGRAM key
  This function is an optional possibility to save this parameter set for the future. Toggle with the X-ARROW keys to "SAVE Pgm.". Select with the Y-ARROW keys a program number. Prior saved programs to the same number will be overwritten without warning. Save the settings by the EDIT PROGRAM key (312). Existing programs can be loaded from here.

2. Load Mask

Watch out for the microscope movement!

- start mask loading sequence: CHANGE MASK key
  You have to take out the mask holder, flip it 180° and put it on the tray left. If a mask is loaded, press ENTER to toggle the mask vacuum off, retract the mechanical mask clamp and remove the mask.
- load mask and fix it: ENTER key
  Place the mask onto the mask holder against the stop pins. Toggle the mask vacuum on by pressing the ENTER key. Activate the mechanical mask clamp by pressing on the leaf spring.
- slide the mask holder back into the machine and clamp it: CHANGE MASK key
  Flip the mask holder 180° back and move it into the machine. Lock the mask holder slide by pressing CHANGE MASK key again.

3. Load Wafer

- first pull out transport slide and load wafer: EXPOSURE key
  The machine instructs: "pull slide and load substrate onto chuck". Pull out the transport slide completely. Insert the proper chuck and place the wafer against the prealignment pins. Confirm with ENTER key. Now the wafer is hold by vacuum.
- move slide in: ENTER key
  The machine instructs: "move slide into machine and confirm with ENTER"
- wedge error compensation
  WEC starts automatically after the last action is completed. The wafer is adjusted parallel to the mask.

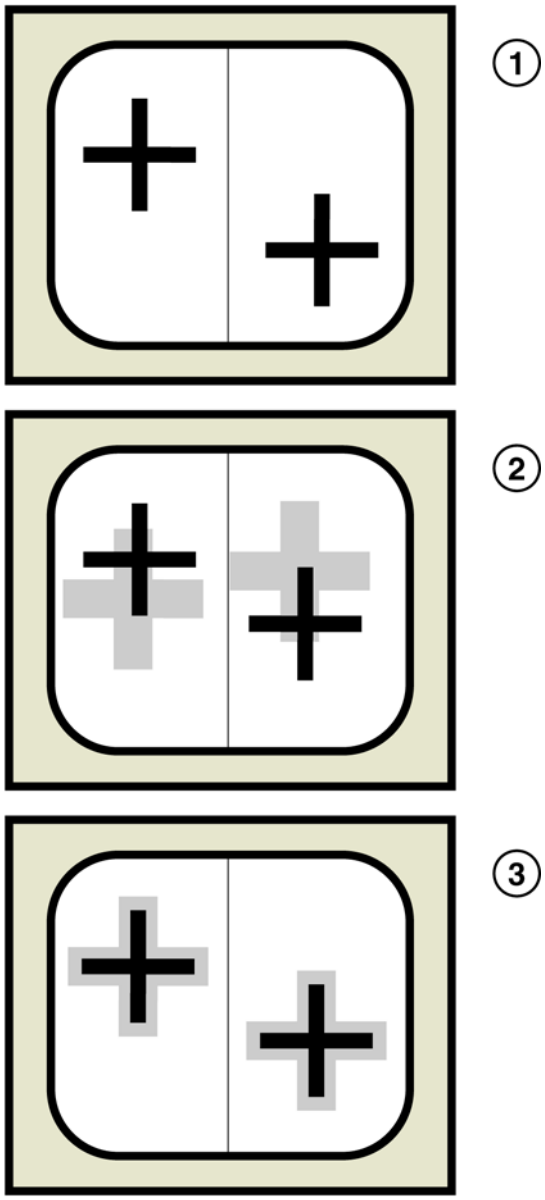
4. Exposure

After WEC the wafer moves automatically in exposure position. Depending on the exposure program selected all program steps will be performed automatically. Exposure takes place. After finishing the wafer chuck moves down to unload the exposed wafer.

5. Unload Mask: CHANGE MASK key

Hit the CHANGE MASK key and the mask holder will be released. Pull the mask holder out, flip it by 180° and store it on the tray to your left. Hit ENTER to switch the mask vacuum off. Retract the mechanical clamping and remove the mask.

1.3.3 Top Side Alignment



Alignment Procedure

1 Grabbed mask alignment marks
2 Superimposed wafer alignment marks
3 Alignment marks central symmetrical aligned

In this mode the wafer is aligned to the mask using the topside alignment microscope (TSA). The following example explains the steps to align and expose with manual mask loading, soft contact print and WEC-type contact. Starting from the initial state of the machine these tasks must be performed:

1. Adjust Parameters

- select mask loading type: F1 key
  Make secure that no mask is loaded before select mask loading manual (default).
- select alignment microscope
  Deactivate BSA MICROSCOPE key (LED off).
- select exposure mode: SELECT PROGRAM key
  Press SELECT PROGRAM key (310). Toggle through the menu and confirm the selection soft contact by pressing SELECT PROGRAM key again.
- edit parameter: EDIT PARAMETER key
  Press EDIT PARAMETER key (311) to edit the parameter exposure time, alignment gap and WEC-type. Change all necessary value and confirm by pressing EDIT PARAMETER key again.
- save all settings: EDIT PROGRAM key
  This function is an optional possibility to save this parameter set for the future. Toggle with the X-ARROW keys to "SAVE Pgm.". Select with the Y-ARROW keys a program number. Prior saved programs to the same number will be overwritten without warning. Save the settings by the EDIT PROGRAM key (312). Existing programs can be loaded from here.

2. Load Mask

Watch out for the microscope movement!

- start mask loading sequence: CHANGE MASK key
  You have to take out the mask holder, flip it 180° and put it on the tray left. If a mask is loaded, press ENTER to toggle the mask vacuum off, retract the mechanical mask clamp and remove the mask.
- load mask and fix it: ENTER key
  Place the mask onto the mask holder against the stop pins. Toggle the mask vacuum on by pressing the ENTER key. Activate the mechanical mask clamp by pressing on the leaf spring.
- Slide the mask holder back into the machine and clamp it: CHANGE MASK key
  Flip the mask holder 180° back and move it into the machine. Lock the mask holder by pressing CHANGE MASK key again.

3. Load Wafer

- pull out transport slide and load wafer: LOAD key
  The machine instructs: "pull slide and load substrate onto chuck". Pull out the transport slide completely. Insert the proper chuck and place the wafer against the prealignment pins. Confirm with ENTER key. Now the wafer is hold by vacuum.
- move slide in: ENTER key
  The machine instructs: "move slide into machine and confirm with ENTER"

Watch out for the microscope movement!

- wedge error compensation
  WEC starts automatically after the last action is completed. The wafer is adjusted parallel to the mask and moves to the alignment gap. The microscope moves down to start the alignment.

4. Microscope Alignment

- set the TSA to meet your requirements (see 3.2.4): SPLITFIELD switch
  For the M3xx microscope only, an actual TSA-microscope image on the monitor is enabled by turning the SPLITFIELD switch (214) to LEFT. Toggle BSA MICROSCOPE key (322) off. This key switch also the controlled manipulator motors from BSA to TSA. If no camera and monitor exists, use the microscope eyepieces.
- microscope illumination: ILLUMINATION to TSA
  Turn ILLUMINATION switch (210) to TSA and select the light intensity by the potentiometer under this switch. Separate intensity selection for the left/right objective is possible with the aperture located at the left/right microscope front.
- focus on the mask plane: TOP/BOTTOM key
  Coarse focus is possible by using the TSA Z-MOVEMENT knob (402) placed behind the TSA-microscope. Make secure the TOP/BOTTOM key LED (326) is on and adjust the fine focus separately using the TOP SUBSTRATE LEFT/RIGHT (215) regulators. If no motorized focus exist, use the OBJECTIVE FOCUS FINE MANUAL (404) on the microscope.
- adjust microscope to the mask alignment marks
  Move the left/right objective to the left/right mask alignment mark by the OBJECTIVE X-SEPARATION knobs (405).
- grab image: GRAB IMAGE key (option)
  First keystroke grabs the image. The objectives move the focal plane to the wafer and theTOP/BOTTOM key LED (326) goes off. The motor control of the microscope manipulator is disabled at this time. Second keystroke delete the stored image and enables the manipulator again.

5. Wafer Alignment

– focus on the wafer plane
Adjust the left/right microscope image with the BOTTOM SUBSTRATE LEFT/RIGHT (216) regulator. If no motorized focus exist, use the OBJECTIVE FOCUS FINE MANUAL (404) on the microscope.
– alignment
Use the micrometer screws of the alignment stage for STG-X-Y-T-MOVEMENT (103, 104, 105). If these doesn't exist use instead this the ARROW-keys or joysticks. Align the wafer alignment marks central symmetrical to the mask alignment marks(see Figure 7 alignment procedure).

If mask and wafer are in contact (CONTACT INDICATOR on), don't align the wafer!

– alignment check
Depending on your requirements, an alignment check could be helpful using the SEP keys (303), ALIGN CONT/EXP key (304) or the ALIGNMENT CHECK key (305).

6. Exposure

– EXPOSURE key
By pressing this key the wafer will move into exposure position. Exposure takes place. Despite the exposure was initiated hitting the UNLOAD key before the light shutter has opened will continue it's exposure without wafer exposure. After finishing the wafer chuck moves down for unload the exposed wafer.

Watch out for the microscope movement!

7. Unload Mask: CHANGE MASK key

Hit the CHANGE MASK key and the mask holder will be released. Pull the mask holder out, flip it by 180° and store it on the tray to your left. Hit ENTER to switch the mask vacuum off. Retract the mechanical clamping and remove the mask.

1.3.4 Bottom Side Alignment

The wafer is aligned to the mask using the bottom side alignment microscope (BSA). The following example explains the steps to align and expose with manual mask loading, vacuum contact and WEC-type proximity. Starting from the initial state of the machine these steps have to be performed:

1. Adjust Parameters

– select maskloading type: F1 key
Make secure that no mask is loaded before select mask loading type.
– select alignment microscope
Activate BSA MICROSCOPE key (LED on).
– select exposure mode: SELECT PROGRAM key
Press SELECT PROGRAM key (310). Toggle through the menu up to exposure type "Vac" and confirm by pressing SELECT PROGRAM key again.
– edit parameter: EDIT PARAMETER key
Press EDIT PARAMETER key (311) to edit the parameter for exposure time, alignment gap, preVac time, fullVac time, purge time and WEC type: spacer. Confirm the settings by pressing EDIT PARAMETER key again.
– save all settings: EDIT PROGRAM key
This function is an optional possibility to save this parameter set for the future. Toggle with the X-ARROW keys to "SAVE Pgm.". Select with the Y-ARROW keys a program number. Prior saved programs to the same number will be overwritten without warning. Save the settings by EDIT PROGRAM key (312). Existing programs can be loaded from here.

2. Load Mask

Watch out for the microscope movement!

– start mask loading sequence: CHANGE MASK key
You have to take out the mask holder, flip it 180° and put it on the tray left. If a mask is loaded, press ENTER key to toggle the mask vacuum off, retract the mechanical mask clamp and remove the mask.
– load mask and fix it: ENTER key
Place the mask onto the mask holder against the stop pins. Toggle the mask vacuum on by pressing the ENTER key. Activate the mechanical mask clamp by pressing on the leaf spring.
– slide the mask holder back into the machine and clamp it: CHANGE MASK key
Flip the mask holder 180° back and move it into the machine. Lock the mask holder slide by pressing CHANGE MASK key again.

3. Load Wafer Chuck for BSA

– Insert a proper chuck without wafer onto the transport slide
Move the BSA-chuck placed onto the transport slide into the machine. Don't press a key.

4. Microscope Alignment

– set the monitor image: SPLITFIELD switch
Turn the SPLITFIELD switch (214) to middle position and toggle BSA MICROSCOPE key on (LED on). This key enables the microscope manipulators accordingly.
– microscope illumination: ILLUMINATION to BSA/IR
Turn the ILLUMINATION switch (210) to BSA/IR and adjust the light intensity by the potentiometers labeled BSA/IR microscope illumination left/right (211).
– focus on the top focus plane: TOP/BOTTOM key
Make secure the TOP/BOTTOM key LED (326) is on and adjust the fine focus separately with the TOP SUBSTRATE LEFT/RIGHT regulators.
– move objectives to the chuck opening: LEFT, BOTH, RIGHT keys
Select one of these keys to move the left/right objective with the ARROW keys. If necessary use fast speed (FAST key LED on).
– grab image: GRAB IMAGE key (option)
First keystroke grabs the mask image. The objectives move to the wafer focus plane (TOP/BOTTOM key LED off). The motor control of the microscope manipulator is disabled. Second keystroke GRAB IMAGE key deletes stored image and enables the manipulator again.

5. Load Wafer

– pull out transport slide and load wafer: LOAD key
After grab image the machine informs you: "ready for load... BSA image stored". Press LOAD key to start this procedure. Load wafer onto chuck and push slide into the machine as prompted on the display. Press ENTER key.

Attention! Microscope moves downwards!

– wedge error compensation
WEC starts automatically. After WEC the wafer will move to the alignment gap.

6. Wafer Alignment

– focus on the wafer plane
Adjust the left/right objective image with the BOTTOM SUBSTRATE LEFT/RIGHT (216) regulators. Correct illumination if necessary.
– alignment
Use the micrometer screws of the alignment stage for STG-X-Y-Θ-MOVEMENT (103, 104, 105). If these doesn't exist use instead this the ARROW-keys or joysticks. Align the wafer alignment marks central symmetrical to the mask alignment marks (see Figure 7 alignment procedure).

If mask and wafer are in contact (CONTACT INDICATOR on), don't align the wafer!

– alignment check
Depending on your requirements, an alignment check could be helpful using the SEP keys (303), ALIGN CONT/EXP key (304) or the ALIGNMENT CHECK key (305).

7. Exposure

– EXPOSURE key
By pressing this key the wafer will move into exposure position. Exposure takes place. Despite the exposure was initiated hitting the UNLOAD key before the light shutter has opened will continue it's exposure without wafer exposure. After finishing the wafer chuck moves down for unload the exposed wafer.

8. Unload mask: CHANGE MASK key

– CHANGE MASK key
Hit the CHANGE MASK key and the mask holder will be released. Slide the mask holder out, flip it by 180° and store it on the tray to your left. Hit ENTER to switch the mask vacuum off. Retract the mechanical clamping and remove the mask.

1.3.5 Single Bottom Side Alignment

This procedure describes the adjustment of small substrates to a mask using only one BSA microscope. Therefor we recommend a transparent wafer chuck. Starting from the initial state of the machine these steps have to be performed:

1. Adjust Parameters

– select maskloading type: F1 key
Make secure that no mask is loaded before select mask loading type. Select mask loading by slide with BSA alignment.

– select single BSA align: F1 key
Toggle to single BSA align and enable this option.
– select alignment microscope
Activate BSA MICROSCOPE key (LED on).
– select exposure mode: SELECT PROGRAM key
Press SELECT PROGRAM key (310). Toggle through the menu up to the desired exposure type and confirm by pressing SELECT PROGRAM key again.
– edit parameter: EDIT PARAMETER key
Press EDIT PARAMETER key (311) to edit the parameter for the exposure. Confirm the settings by pressing EDIT PARAMETER key again.
– save all settings: EDIT PROGRAM key
This function is an optional possibility to save this parameter set for the future. Toggle with the X-ARROW keys to "SAVE Pgm.". Select with the Y-ARROW keys a program number. Prior saved programs to the same number will be overwritten without warning. Save the settings by EDIT PROGRAM key (312). Existing programs can be loaded from here.

2. Load Mask

Attention! Microscope moves up!

– start mask loading sequence: CHANGE MASK key
Follow the displayed instructions.
– load mask holder
For this sequence make sure the prealignment pins and the mechanical mask clamping is removed from the mask holder.
– load mask transfer chuck and mask: ENTER key
Insert mask transfer chuck into transport slide. Load mask face down onto mask transfer chuck. Toggle the mask vacuum on by pressing the ENTER key.
– slide the transport slide in: ENTER key
For non motorized stages only if the chuck is not centered, move it with the micrometer screws to the middle position. Confirm with ENTER key. After WEC relative to the mask holder the mask is in 100 µm alignment gap.
– alignment preparation
Enable the used single BSA microscope using the SPLITFIELD switch (214). Adjust the microscope illumination using the BSA/IR microscope illumination left/right (211). Focus on the mask plane by activating the TOP/BOTTOM key (326) and the corresponding TOP SUBSTRATE LEFT/RIGHT focus regulator (215). Search for a reference mask alignment mark with the BSA microscope. Store this stage position by activating the SET REFERENCE key (314). Search for a second mask alignment mark only by the x-movement of the BSA-microscope. Toggle back to the reference alignment mark using the SCAN key (315). Press GRAB IMAGE key (327) to store the reference alignment mark image. Toggle to the second alignment mark using the SCAN key (315).
– mask alignment
For an motorized stage only switch the manipulator control to the stage activating the STG/TSA/BSA button (601). Adjust the real mask alignment mark to the stored one only with the (Θ-JOYSTICK (605) or the (Θ-micrometer screw of the alignment stage about 1/2 of the misalignment. Switch the manipulator control to BSA deactivating the STG/TSA/BSA button (601). Toggle to the reference alignment mark using the SCAN key (315). Press GRAB IMAGE key (327) twice to release the stored and grab the new image. Press SCAN key (315) to toggle to the second alignment mark position. Repeat this mask alignment until there is no misalignment left.
– load mask: ENTER key
Pressing ENTER the mask moves to the mask holder and is taken by the mask holder vacuum. Transport chuck moves down for unloading.

3. Load Substrate

– load wafer chuck and substrate onto the transport slide: LOAD key
We recommend to use a transparent wafer chuck. Move the loaded transport slide in and confirm with ENTER key.
– wedge error compensation
WEC starts automatically. The substrate moves to the alignment gap.

4. Substrate Alignment

– alignment preparation
Adjust the microscope illumination using the BSA/IR microscope illumination left/right (211). Select the Substrate focus plane by deactivating the TOP/BOTTOM key (326). Focus by the BOTTOM SUBSTRATE LEFT/RIGHT focus regulator (216). Search for a reference wafer alignment mark with the BSA microscope. Store this stage position by activating the SET REFERENCE key (314). Search for a second wafer alignment mark only by the x-movement of the BSA-microscope. Toggle back to the reference alignment mark using the SCAN key (315). Press GRAB IMAGE key (327) to store the reference alignment mark image. Toggle to

the second alignment mark using the SCAN key (315).

– substrate alignment
For an motorized stage only switch the manipulator control to the stage activating the STG/TSA/BSA button (601). Adjust the real substrate alignment mark to the stored one only with the Θ-movement of the alignment stage about 1/2 of the misalignment. Switch the manipulator control to BSA deactivating the STG/TSA/BSA button (601). Press SCAN key (315) to toggle to the reference position. Press GRAB IMAGE key (327) to release the stored image. Deactivate the TOP/BOTTOM key (326) and grab the new image using GRAB IMAGE key (327). Repeat this substrate alignment until there is no misalignment left.

– substrate to mask alignment
Move the substrate away using the x-y-movement of the alignment stage to see a real mask alignment mark. Focus on the mask plane by activating the TOP/BOTTOM key (326) and using the corresponding TOP SUBSTRATE LEFT/RIGHT focus regulator (215). Press GRAB IMAGE key (327) to store the mask alignment mark. Move the substrate back using the x-y-movement of the alignment stage. Focus on the substrate plane by deactivating the TOP/BOTTOM key (326) and using the corresponding TOP SUBSTRATE LEFT/RIGHT focus regulator (215). Align the substrate alignment mark central symmetrical to the mask alignment mark. Check the alignment using the ALIGN CONT/EXP key (304).

5. Exposure

– EXPOSURE key
By pressing this key the substrate will move into exposure position. Exposure takes place. Despite the exposure was initiated hitting the UNLOAD key before the light shutter has opened will continue it's exposure without substrate exposure. After finishing the wafer chuck moves down for unload the exposed substrate.

6. Unload Mask

– CHANGE MASK key
Hit the CHANGE MASK key to start the unload procedure. Follow the displayed instructions to unload the mask.

1.4 Advanced Technology

1.4.1 Exposure Programs

An important parameter for the exposure is the contact method between mask and wafer. The type of exposure program is selectable with the SELECT PROGRAM key. After this selection it is possible to edit all corresponding parameters by pressing the EDIT PARAMETER key.

Proximity Exposure

This is the most careful exposure for the mask. Mask damage is reduced to a minimum. But the structural resolution is not as high as with any contact exposure. Between mask and wafer is a distance left, the exposure gap. The gap value is adjustable by the EDIT PARAMETER key. The wedge error compensation is performed by using three precision reference spacers between mask and wafer.

Soft Contact Exposure

Mask and wafer are brought in contact. The structural resolution is better than in proximity exposure. The vacuum securing the wafer onto the chuck is maintained during exposure. The only force to press the wafer against the mask is the force applied during WEC.

Hard Contact Exposure

This is similar to soft contact mode. After the wafer has moved into contact the vacuum underneath the wafer is switched off and nitrogen is purged under the wafer instead. So a closer contact between wafer and mask is guaranteed, even with large wafers.

Vacuum Contact Exposure

This mode performs the highest resolution levels. After the WEC and alignment the wafer is brought into contact with the mask. The rubber seal of a necessary vacuum chuck is creating a mini chamber between mask and wafer. The rubber seal pressure is adjustable by the VACUUM SEAL regulator (206). This chamber is evacuated in steps. Pre vacuum gently pulls vacuum into that mini chamber to enable a smooth contact between mask and wafer. Furthermore it prevents gas bubbles to be trapped between both. Full vacuum will be applied with the next step. The wafer will be loaded in the closest contact position. The vacuum securing the wafer on the chuck is replaced by nitrogen. In this mode the best contact between mask and wafer is achieved. After the exposure nitrogen will purge into the mini chamber to

break the vacuum. The larger the wafer the longer the vacuum and purge times. For best results start a test with long times and reduce them gradually. All the parameter could be set using the EDIT PARAMETER key (311).

Low Vacuum Contact Exposure

This mode is similar to vacuum contact with one difference: The vacuum level in the wafer chamber can be adjusted by the LOW VACUUM ADJUSTMENT regulator (205). So the high resolution level of the vacuum contact exposure can be combined with a minimum mechanical stress for wafer and mask. Set an appropriate vacuum with the vacuum chamber regulator (205) and test the result using the ALIGNMENT CHECK key (305).

Flood Exposure

It is possible to exposure the whole wafer without a mask. After this mode is selected, the exposure can be started from the initial state by pressing the EXPOSURE key (316). The exposure takes place as long as the exposure time was set independent if a mask (and mask holder) is loaded or not.

1.4.2 Multiple Exposure

For special applications the numerical value for the overall exposure time can be segmented into equal exposure intervals alternating with wait time intervals in which the wafer is not exposed. One exposure time and one wait time is named as one exposure cycle.

To perform Multiple Exposure proceed as follows:

- Select the corresponding exposure program by the SELECT PROGRAM key (310).
- Press the Multiple Exposure key (317).
- Press the EDIT PARAMETER key (311).
- Edit the parameter for the exposure program. Edit the numerical value of the corresponding parameters wait time and cycles.
- Press the flashing EDIT PARAMETER key to finish editing and start alignment followed by the multiple exposure process.

1.4.3 Wedge Error Compensation

During this procedure the top side of the wafer will be set exactly parallel to the bottom side of the mask. This guarantees a perfect gap setting and so a homogeneous quality of the exposed structures over the whole wafer. Set the WEC type using the EDIT PARAMETER key (311).

Two methods are standard:

- contact mode:
  For the exact parallel setting the wafer will be moved against the mask.
- spacer mode:
  To treat mask and wafer with maximum care the machine moves spacers in between both. A proximity mask holder is necessary. Contact area is reduced to three points near the wafer edge.

Additionally two other methods are also possible. Global WEC between mask and chuck. This could be used for pieces or other special applications. It is mandatory to set the thickness of a substrate or wafer accordingly before WEC procedure is initiated.

- global WEC contact mode:
  The WEC will be performed between wafer chuck and mask without the wafer (GlobCont). Before alignment set the wafer thickness. Another parameter of the EDIT PARAMETER menu is listed. It is the substrate thickness.
- global WEC spacer mode:
  The WEC will be performed between wafer chuck and mask using spacers in between (GlobSpac). Depending of the spacer and substrate dimensions it's enabled to perform this with a loaded substrate. Before alignment set the wafer thickness using the EDIT PARAMETER menu.

1.4.4 Load Mask by Slide

Additional to the manual mask loading (described in the operating procedures, Chapter 3.3.3, Load mask) this method is available. Mask and mask holder must not be flipped 180°. The active side of the mask is never face up. A standard mask holder and mask loading chuck are necessary. Working with this loading sequence prealignment pins and mechanical mask clamping has to be removed from the mask holder. Load the mask holder in the stage and clamp it. insert the mask transfer chuck in the transport slide and place the mask face down on it. Fix it by toggle the vacuum on. Move transport slide in the machine and confirm. Now there are two possibilities depending of the prior selection (by F1 key):

- without alignment
  The machine moves the mask against mask holder. After the vacuum sensor detect that the mask holder vacuum take in the mask, the transport slide vacuum switches off. Transport slide moves down.

– with alignment
  The machine moves the mask against mask holder and backwards in a alignment gap. Align mask now and confirm finally with ENTER key. Mask moves up. Same procedure as described in without alignment follows.

1.5 Step by Step Machine Interactions

1.5.1 Select Mask Loading Type

For example: select manual mask loading (default)

Unload the mask before this selection is initiated!

Display message	Following operator action (keystroke)
"ready for Load"	F1
"microscope up/down"	x →
"change align speed"	x →
"single step config"	x →
"centering stage"	x →
"select maskloading"	ENTER
"manual"	x →
"slide"	x →
"manual"	ENTER
"ready for load"	

1.5.2 SELECT PROGRAM for Exposure

For example: select soft contact

Display message	Following operator action (keystroke)
"ready for Load"	SELECT PROGRAM
"Exposure Type: Soft"	y
"Exposure Type: Flood E"	y
"Exposure Type: Prox"	y
"Exposure Type: Vac"	y
"Exposure Type: Low Vac"	y
"Exposure Type: Hard"	y
"Exposure Type: Soft"	SELECT PROGRAM
"ready for Load"	

1.5.3 EDIT PARAMETER Menu

For example: select exposure time, alignment gap, WEC type and exposure type

The number of parameters listed depends of prior selections.

Display message	Following operator action (keystroke)
"ready for Load"	EDIT PARAMETER
"Exp. Time [s]: 5.0"	x → (Edit value by Y↑ and Y↓)
"Al. Gap [µm]: 100"	x → (Edit value by Y↑ and Y↓)
"WEC Type: Contact"	x → (Edit value by Y↑ and Y↓)
"Exposure Type: Soft"	x → (Edit value by Y↑ and Y↓) Press EDIT PARAMETER key to confirm the edited value
"ready for Load"	

1.5.4 Changing the TSA, BSA and Stage Alignment Speed

(If necessary)

Display message	Following operator action (keystroke)
"ready for Load"	F1
"microscope up/down"	x →
"Change align speed"	ENTER
"BSA Parameter Slow Speed [%]: 39"	x → (Edit value by Y↑ and Y↓)
"STG Parameter Slow Speed [%]: 39"	x → (Edit value by Y↑ and Y↓)
"TSA Parameter Slow Speed [%]: 39"	x → (Edit value by Y↑ and Y↓)
"BSA Parameter Slow Speed [%]: 39"	ENTER
"ready for Load"	

(to edit the fast speed activate the FAST key, LED on)

1.5.5 EDIT PROGRAM Menu

For example: save a program

All active parameters and the stage position are stored. A stored file number is indicated with [0] on the display.

Display message	Following operator action (keystroke)
"ready for Load"	EDIT PROGRAM
"Load Pgm. From: 0"	x → (Edit value by Y↑ and Y↓)
"EXIT Pgm. Editor"	x →
"DELETE Pgm. no: 0"	x → (Edit value by Y↑ and Y↓)
"SAVE Pgm to: 0"	(Edit value by Y↑ and Y↓) EDIT PROGRAM
"ready for Load"	

1.5.6 Change Mask

For example: manual

Display message	Following operator action (keystroke)
"ready for Load"	CHANGE MASK
"Change Mask - press ENTER to toggle mask vacuum: OFF"	• pull out mask holder and flip it 180° • deposit it on the tray left • place the mask against the stop pins • press ENTER
"Change Mask - press ENTER to toggle mask vacuum: ON"	• activate the mechanical mask clamping by pressing the leaf spring • flip mask holder 180° and slide it back into the machine (up to the end and preverably to the right position) • press CHANGE MASK
"ready for Load"	

1.5.7 Load Wafer

Display message	Following operator action (keystroke)
"ready for Load"	LOAD
"pull slide and load substrate onto chuck"	• place wafer against the prealignment pins on the chuck • confirm with ENTER • vacuum on transport slide goes on
"move slide into machine and confirm with ENTER"	ENTER
"performing WEC - please wait..."	
"microscope moving - please wait..." (if BSA MICROSCOPE key is off)	
"Align substrate"	• setup microscope (see chap. 3.3.3, par. 4) • align wafer • optional check the alignment using ALIGN CONT/EXP key (304) or ALIGNMENT CHECK key (305) • press EXPOSURE
"z-axis moving - please wait..."	(wafer moves to exposure position)
"Microscope moving - please wait..."	(exposure takes place)
"please wait..."	(wafer moves down)
"Microscope moving - please wait..."	
"pull slide and unload exposed substrate"	do it
"ready for Load"	

1.5.8 Load Mask by Slide

For Example: load mask by transport slide with BSA align

Unload the mask before this selection is initiated!

Display message	Following operator action (keystroke)
"ready for Load"	F1
"microscope up/down"	x →
"Change align speed"	x →
"single step config"	x →
"centering stage"	x →
"select maskloading"	ENTER
"manual"	x →
"slide"	ENTER
"no align"	y ↑
"TSA align"	y ↑
"BSA align"	ENTER
"ready for Load"	CHANGE MASK
"Load maskholder"	ENTER
"Load mask transfer plate and mask"	ENTER
"Perform mask loading - please wait"	

Display message	Following operator action (keystroke)
"continue: ENTER - align mask abort: UNLOAD"	 • align mask using the alignment stage controls and continue with ENTER
"Performing mask loading - please wait"	(mask vacuum takes mask in)
"center chuck automatically"	(mask transfer chuck goes down)
"ready for Load"	

1 Operation of the Machine

2. MAINTENANCE

2.1. General

This chapter will acquaint you with the general maintenance requirements and will outline the procedures for periodic maintenance and calibration such as lamp replacements, intensity and uniformity checks, power supply calibration and gap checks.

2.1.1. General Maintenance

The short time which you spend performing the following checks and tests will greatly improve the overall performance of the mask aligner. Furthermore be alert at all times to any unusual machine noises, behavior, or changes in operation or results which may be symptomatic of problems which could damage the machine if left uncorrected.

2.1.2. Visual Checks

It is most important to conduct a thorough visual check of the machine. Key areas include chuck and maskholder. These parts should be free of dust and residues, especially photoresist and pieces of broken substrates. Also inspect for scratches and other signs of wear since the use of scratched or damaged chucks and mask holders will result in poor equipment performance.

Inflateable vacuum seals on chucks are especially susceptible to damage by broken pieces.

Caution!

To remove substrate pieces from the machine use always gloves AND tweezers to avoid skin contact.

2.1.3. Test Run

Run the equipment through a standard operating program. All major subassemblies should function properly i.e.

- Manipulators
- Alignment stage movement
- Mirror house movement
- Microscopes

2.1.4. Safety System Check

Inspect the machine for changes, which could be harmful. Watch for evidence of degradation or unintended modifications.
At regular intervals (at least monthly) check the interlock systems. Activate the EMO to unpower the machine, lamp and CIC.
With lamp OFF ubt CIC in satand -by, test:

- lamp house door interlock
- lamp socket cooling interlock by switching off N2 supply or by reducing cooling flow.

2.2. Preventive Maintenance for MA6/ MA8

Warning!

Always set the machine to a safe status before starting maintenance or service tasks.

If there is any doubt about safety requirements, completely de-energize the machine.

Read and understand the warnings in the safety chapter of this manual.

2.2.1. Cleaning

The following situations require specific cleaning of the machine:

- Contaminated optical parts:
  (see the specific chapter for cleaning of optics below)

- Any contamination at process surfaces or at vacuum grooves or seals:
  remove contaminants immediately by gently applying an IPA soaked lintfree tissue or a vacuum

cleaner.

- Machine contaminated by broken fragments of wafers or substrates:
  remove such fragments directly before they could enter to delicate moving subassemblies (e.g.wedge error compensation head WEC) or before they could damage vacuum seals or process surfaces. During removal wear safety goggles and gloves and preferably use tweezers. If tweezers access is not possible, use a syringe or a vacuum cleaner; or blow it away using CDA - which method may be more adequate to avoid damage.

- Machine contaminated photo resist:
  remove resist contaminations immediately with IPA soaked tissue before they harden and may require aggressive solvents for removal, which could damage the machine surface.
  Observe the warnings in the safety chapter when working with solvents!

2.2.2. Lamp Service

With every lamp exchange check the quality of electrical connections and of the cooling.
- Check that all electric connections in the lamp house are metallic clean, replace any darkened electric part!
- Check that the lamp sockets are still not darkened after use, otherwise check and readjust lamp cooling according to the respective values listed in the lamp cooling section; check that socket cooling nozzles are correctly directed to the metallic lamp sockets.

2.2.3. Greasing

No regular lubrication is required. The rails of the mirror house and of the chuck slider can be greased annually very thin with NBU15.

2.2.4. WEC-Check

If a Heidenhain measurement set is available, parallelity should be checked from time to time. Procedure details are described int he manual of the Heidenhain set.

2.2.5. Recommended SUSS Service

To keep the machine in perfect running order it is recommended that a SUSS service technician should inspect the system completely every 2 or 3 years. If the machine is used for full time production (i.e. 3 shifts), the inspection is recommended every 6 months. This inspection will include a full test of WEC-functionality and re-adjustment of WEC-system.

2.3. Measuring the Intensity/ Uniformity of the Exposure Light

In order to ensure that exposures will be satisfactory for uniform production results, it is important that the values of the light intensity are within well defined limits. With the optical probe, measure the light intensity at different points of the substrate. For this purpose use the special measuring plate. Using the high (H) and low (L) readings, determine that the uniformity, as calculated by the formula:

Uniformity (%) =[(H-L) / (H+L)] x 100

is less than the specified value for your particular optical system.

H [mW/cm²] = Intensity, highest value
L [mW/cm²] = Intensity, lowest value

Once the calculated value of the uniformity lies within the given limits, calibrate the power supply as described in the power supply manual.

2.3.1. Power Supply Calibration

To perform these adjustments, please refer to the power supply manual (CIC).

2.3.1.1. Constant Intensity Controller

After a new exposure lamp has been installed and adjusted for intensity and uniformity, the power supply for the exposure lamp must be adjusted.
First it is necessary to adjust the power supply to the

measurement obtained on the power meter with the optical probe placed in the center of the exposure field. Then the power supply is adjusted to the desired intensity output. After adjustment, the reading on the power meter should track the reading on the power supply.
Also reset the lamp life counter.

2.3.1.2. Constant Power Controller

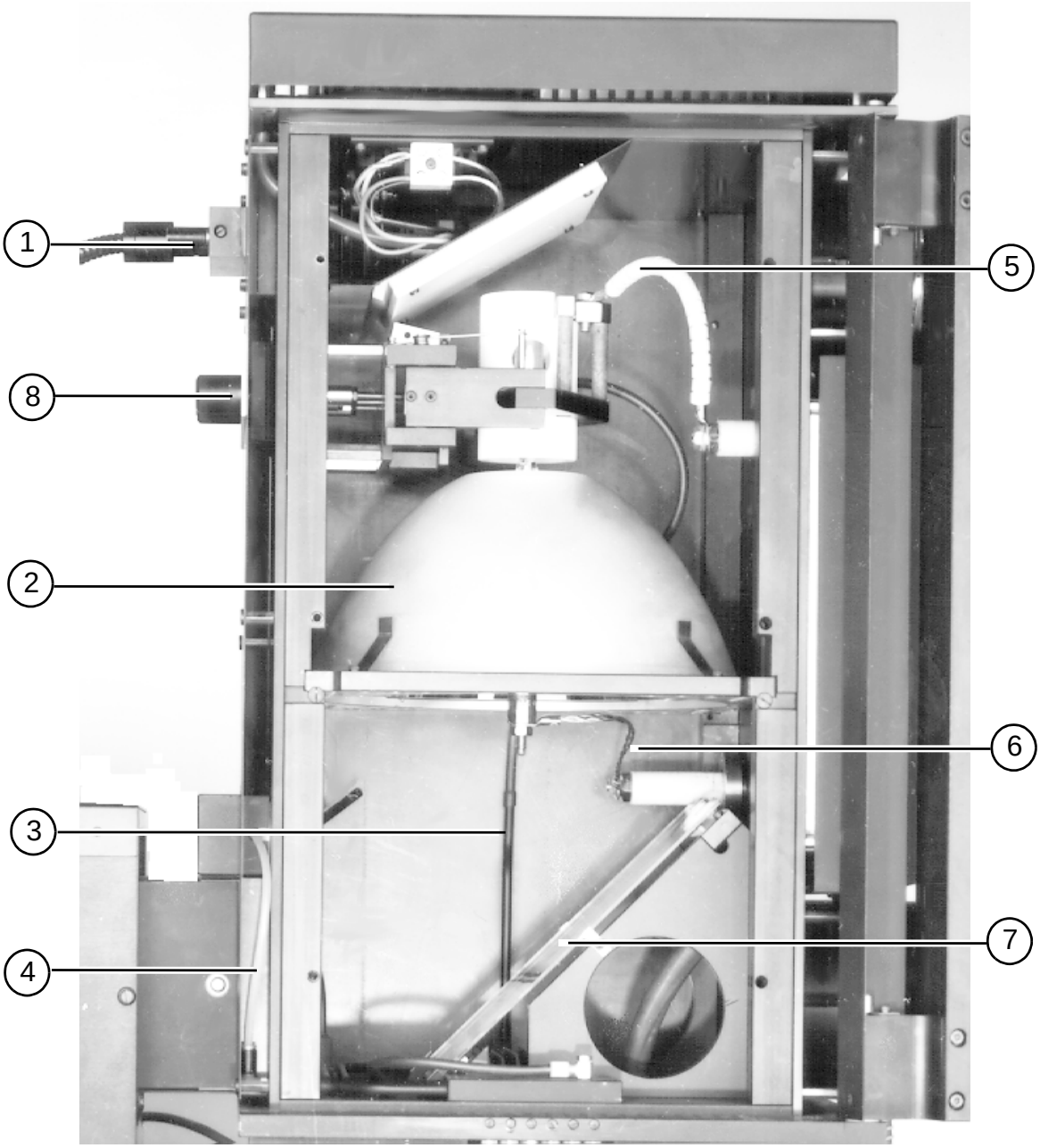
The input power of the lamp should not exceed the manufacturer's specification.

- Find the corresponding instructions in the data sheet packed with each lamp.
  To perform these adjustments, refer to the power supply manual.

2.3.2. Alignment of Lamp in Ellipsoid Mirror

According to a cartesian coordinate system X, Y, Z the exposure lamp is brought into the correct position by actuating the manipulator control knobs Y, Z and X correspondingly. The manipulator controls are located on the front side of the lamp house. Optionally the manipulators may be connected by spindles to knobs on front of the machine.

2.3.2.1. Interior of the Lamp House LH1000



1 Microscope illumination, fiber optics
2 Ellipsoidal mirror
3 Nitrogen supply tubing
4 Shutter (not visible)
5 Connecting cable, cathode (-) of exposure lamp
6 Connecting cable, anode (+) of exposure lamp
7 Cold light mirror
8 Adjustment knobs for position of exposure lamp (X,Y,Z)

2.4. Replacement of the Exposure Lamp 1000 W

See also Chapter 1: Warnings and Safety , section „Chemical Hazards“.

Danger!

UV lamps are pressurized and contain mercury.

If handled careless the lamp may explode emitting shivers and spilling the mercury.

Store lamps always in the original box.

Handle lamps only with protective goggles or face shield and gloves.

Let the lamp cool down after use.

See the safety section of this manual for a more detailed description of adequate lamp handling.

Do not touch the quartz bulb of the exposure lamp or cold light mirror with your fingers. Clean inadvertently touched spots immediately with alcohol and a soft lint-free cloth.

2.4.1. Replacement Procedure

- Switch off the mask aligner by main switch.
- If the exposure lamp power supply CIC is separately supplied, switch it off, too.
- Do not open the lamp house until the lamp has been switched off for at least 20 minutes.
- Unscrew the screws securing the door of the lamp house and swing it open.
- Protect the cold light mirror with lint-free tissue.
- Disconnect the lead wire of the exposure lamp (remove corresponding unit securing the positive terminal of the lead wire) and remove.
- Loosen lever holding the upper socket of the exposure lamp and remove lamp from the lamp house.

Warning!

Handle the lamp only by its metal ends.

Do not mechanically stress the lamp during installation, the glass bulb could break or explode.

- Take the new lamp from its box and remove the knurled nuts, which are no longer needed. If they are used, they may intercept light from the ellipsoidal mirror, causing a loss of uniformity and overheating of the lamp.
- Install the negative terminal (non-engraved end) of the new lamp in the socket on top of the lamp house (using the adapter if required), by grasping the lamp at the positive terminal (engraved end) of the lamp.
- Connect the lead wire (positive terminal) and guarantee a well conducting electrical contact without cracking the lamp or the feed through. Never twist the body of the lamp or of the feed through. Counterold directly besides the nut.Replace parts with worn-out electric contacts.
- Close the lamp house and secure it with three screws.
- Pack the used lamp carefully to the original box for save storage or disposal.

2.4.2. Adjusting the Exposure Lamp

All exposure lamp adjustments are done with the exposure lamp power supply in idle mode.

In order to perform the adjustments, you will need an intensity meter and the appropriate optical probes for the wavelength 405 nm, 365 nm, 320 nm, 240 nm, or 220 nm.

WARNING!

The UV and IR radiation produced by the exposure lamp can cause eye damage and skin burns.

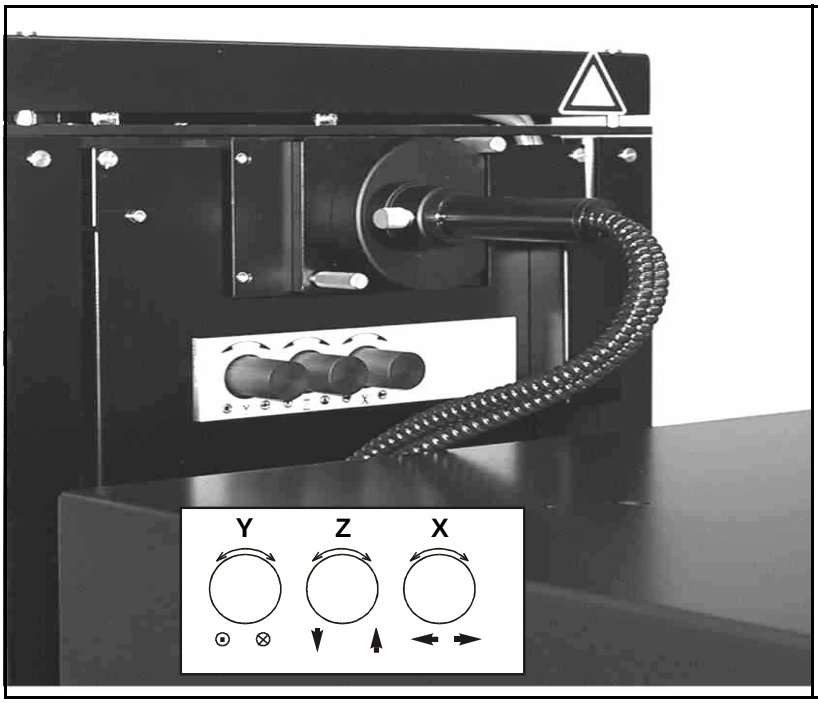
Personnel entrusted with the adjustment of the exposure lamp should wear eye and skin protection against ultraviolet radiation and should avoid extensive exposure.

SUSS MicroTec will not be responsible for injuries arising from incorrect or unprotected work with these systems.

- Switch ON the mask aligner main switch.
- Switch ON the nitrogen and compressed air sources which provide cooling for the lamp house. Check for correct settings of cooling pressure at the bottom pressure meter if necessary. Adjust the corresponding regulator to the

proper setting.(see section Utilites and Lamp Cooling).
- Switch ON the exposure lamp power supply CIC and check that the correct lamp type is selected. If not, change to correct type.
- Reset the lamp life time counter for the new lamp (see CIC manual for details).
- Press CP at the CIC.
- Ignite the exposure lamp by pressing the START button. Allow the lamp to stabilize for at least 15 minutes.
- Start the mask aligner.
- Complete the LOGIN procedure.
- Load the LIGHT MEASURE program (button LAMPTEST).
- Place a measuring plate instead of the exposure chuck to avoid scratching of the surface. Place the optical probe on the plate.

The three lamp adjustment knobs X, Y, and Z on the lamp house are used to adjust the position of the exposure lamp in the ellipsoidal mirror. Their main purpose is to achieve an uniform light distribution over the given exposure area



Z-knob: shifts the lamp vertically and thus primarily controls the light intensity.
Y-knob: shifts the lamp in the Y-direction.
X-knob: shifts the lamp in the X-direction.

2.4.2.1. Adjustment Procedure

- Maximize the respective readings on the power meter by first shifting the lamp in the Z-direction and then in the X- and Y-direction.

- Placing the probe alternately at the right and left hand edges of the illuminated area, use the X-knob to shift the lamp into the corresponding direction until the meter gives the same reading at both locations.
- Placing the probe alternately at the front and rear edges of the illuminated area, use the Y-knob to shift the lamp into the corresponding direction until the meter gives the same reading at both locations.
- Recheck the position of the vertical adjustment knob (Z-knob).

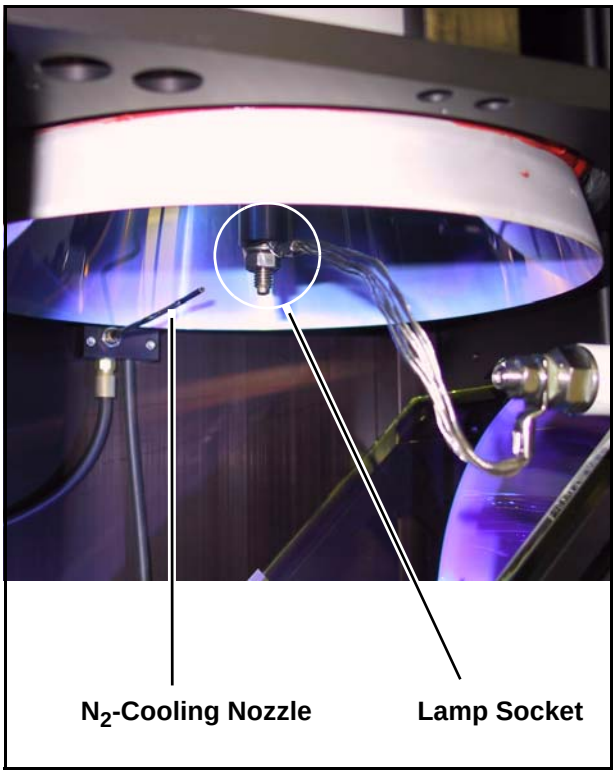
NOTE:
The Z-knob must only be used to maximize the intensity of the exposure lamp. If you wish to adjust the intensity for process purposes, either adjust the power supply output or use proper filters. Using the Z-knob to decrease the intensity will result in a build-up of excess heat in the lamp house which could lead to lamp explosion. In order to achieve the best position for an even distribution of light, the Z-knob must not be readjusted from its maximum intensity position more than one half turn.

2.4.3. N2-Control

Cooling of lamp sockets is adjusted by two pressure valves 11/R5.X (X= 2 and 5), one for each lamp socket (in LH1500). The pressure for the lower socket is continuously monitored by the pressure meter 11/C4.

- The adjustment of the N_2 pressure valves has to be done following any part exchange in the cooling system.
- Only qualified service personnel is allowed to perform the adjustment. For details see sections: Working with the Mask Aligner in Chapter 1 and Utilities in Chapter 2.
- The setting must be completed prior to starting a lamp. Otherwise there is a risk of lamp explosion.

Caution!
Whenever the ellipsoid mirror or the coldlight mirror has to be exchanged be sure to readjust the N2-cooling nozzle (see fig. below) to cool the lower lamp socket. Otherwise there is a risk of lamp explosion.



2.4.4. Exhaust Flow Control (in Lamp house Intake Tube)

The exhaust flow must be adjusted on site during machine installation using the factory exhaust system.
The settings must follow the data given in section Utilites and Lamp Cooling.
After final completion of settings, the flow sensor (which is optional and is - if installed - located in the lam house air intake bottom tube) can be checked and readjusted:

- Turn the setting screw in the sensor to the switching point (indication red/green); then turn back to green by a half rotation.

2.4.5. Use of Other Lamps

Smaller lamps (550W, 350W) can be used in the lamp house 1000/1500W if special adapters for the lamp and for socket cooling are installed.
For required parts and cooling specifications ask SUSS Service.

2.4.6. Lamp House 350W and 350W Lamp Replacement

The small lamp house differs to the lamp house 100/1500W in some respect:

- It has no access door on the side, it can be opened only by tilting the head (the upper part) of the lamp house. The head is secured to the bottom segment by a screw with access from top
- It has no interlock to the lamp power supply. Before opening the 350W lamp house, the lamp power supply and the machine must always be switched OFF! Respect the warning labels attached to the lamp house!
- In standard configuration it does not need exhaust for additional cooling or ozone reduction. Forced N2 socket cooling together with natural air convection is sufficient to cool the 350W lamp. The glass bulb of the 350W OSRAM HBO lamp is especially equipped to minimize deep UV radiation, resulting in very low ozone generation.
- Basic equipment is the 350W lamp.
  Potential other lamps are: 200W or 500W. The 200W lamp requires a special lamp socket adapt-

er. The 500W lamp requires removal of the standard 350W socket holder, exchange of socket cooling nozzles (for both sockets) and installation of an exhaust tube at the lower part of the lamp house.
See section lamp cooling in Installation for detailed requirements.
Refitting to 500W must be done by a trained SUSS technician only.

Warning!

Electric hazards and very intense light present in the lamp house 350W.

Never open the 350W lamp house when the machine is still switched on!

Regular lamp replacement in the 350W lamp house is comparable to replacement in lamp house 100/ 1500W:

- See all warnings above and in the chapter Warnings.
- Switch off the main switch.
- Wait until the lamp has cooled down.
- Get access to the lamp house by dismantling the heat protection covers at the sides of the lamp house.
- Unscrew the securing screws on top of the lamp house, and tilt the upper part open.
- Be very careful in handling the lamp and the mirrors.
- Disconnect the wire on the lower lamp socket.
- Unscrew the lamp from the lamp holder and remove lamp.
- Take the new lamp from its box, detach the nuts and screw the lamp to the lamp holder - observing polarity (negative end in the holder for all lamps except 500W deppUV - UXM510MD).
- Fasten the lamp to the holder only hand-screwed
- Re-connect the positive terminal wire - if signs of degradation are visible, replace such electrical connection parts.
- Check function of the socket cooling nozzle
- Close the lamp house and secure it with the top screw.
- Re-install the heat portection covers at the lamp house.

2.5. Replacement of the Microscope Lamp

Depending on the type of lamp house the halogen lamp for microscope illumination is located

- in front top of the lamp house 1000W, where the glass fibre light guide is connected or
- in an extra lamp box located on back of the lamp house 350W

The replacement procedure is the same for both locations:

Exchange of the lamp:
- Loosen the two knurled screws of the lamp holder and pull out the holder carefully.
- Plug off the connection cable of the lamp.
- Loosen the lamp clamping on the holder and remove the lamp.
- Insert new lamp and re-insert holder plate.

Caution!

The illumination lamp could be very hot after use.

Let the lamp cool down for some minutes. Switch off the main switch of the machine or disconnect at least the lamp supply unit during lamp exchange.

Replace always by identical lamp type.

Watch for intense light near to the lamp, as well as at the output of the fiber optic cable!

This could harm your eyes!

2.6. Cleaning of Optical Components

Whenever the resolution worsens significantly - resulting on a blurred or obstructed image - or if light intensity decreases, or if visible contamination is to be seen on the optical components - including a translucent film on mirrors, the optical surfaces should be cleaned.
Deposition on optical surfaces can happen and may be caused by impurity of gaseous media or by process solvents or other process related contamination. Depending on the type of deposition it could be blown off dry or washed off by an appropriate solution.
Be very gentle in cleaning because most optical parts (mirrors, lenses) have high grade coating.

Caution!

High grade optical surfaces are a determining factor for image quality.

When cleaning any optical surface, the surface quality could be damaged heavily if improper method or material is used.

Do not touch optical surfaces with rough material or with bare skin!

Use only solvents and methods as recommended below. NEVER use aggressive solvents like acetone.

Never soak optical components in solvents for an extended time. Adhesive compounds could be dissolved and coatings could be destroyed.

Warning!

Isopropyl alcohol (IPA), Petroleum Ether and many other solvents are highly flammable.

Use of such solvents is only allowed in a well-ventilated area, with ignition sources removed.

Moreover, also cloth soaked with flammable solvent has a potential for self-ignition.

Deposit used soaked tissues according to local safety regulations.

Use of flammable solvents is restricted to adequately trained personnel.

Warnings of the MSDS (Material Safety Data Sheet) must be understand and respected.

2.6.1. Cleaning Materials

- Latex laboratory gloves:
  Protective gloves should always be used, whenever solvents are applied. Moreover, use of gloves will prevent direct touching of optical components, which would result in new contamination.

- Dry cleaning:
  To blow off dust, use only filtered, dry nitrogen gas, applied through an anti-static nozzle. If nitrogen is not available, use extremely clean compressed air (CDA).

- Flushing:
  For final flushing after wet removal of deposits, apply always DI-water. It removes also smears produced by solvents. Remaining water droplets can be removed without residue by a nitrogen blow.

- Detergent solution:
  A mild soap, e.g. dish washing liquid in a 1% dilution with DI-water, is likewise appropriate. Perfumed, alkaline or colored dish washing products are to be avoided.

- Solvent:
  Isopropyl alcohol (IPA) is acceptable as a solvent.Never use acetone to clean the optical surfaces. They could be dissolved and destroyed.
  For obstinate contaminations (e.g. resin) Petroleum Ether (30/40) can be used.

  Note:
  This special light benzine can be supplied by chemical suppliers as Carl Roth (www.carl-roth.de)
  Attend the much higher flammability compared to ordinary gasoline!

- Cloth:
  Avoid wiping with cloth, because any wiping can cause fine scratches in optical coatings.
  If unavoidable for removing of persistent contaminations use only dust- and lint-free tissues, such as lens cleaning tissues or equivalent. Soak the tissue with solvent and apply only by wiping with a gentle, figure eight motion or by dipping off gently.
  For removal of small local contamination spots as well as for wiping very small lenses the lens tissue should be twisted around a swab.
  Do not use any plastic cloths or plastic swab stems for cleaning. Plastics could be dissolved by alcohol and produce a smear coating on the optical components.

2.6.2. Application Technique

Preparation for cleaning of optical components:

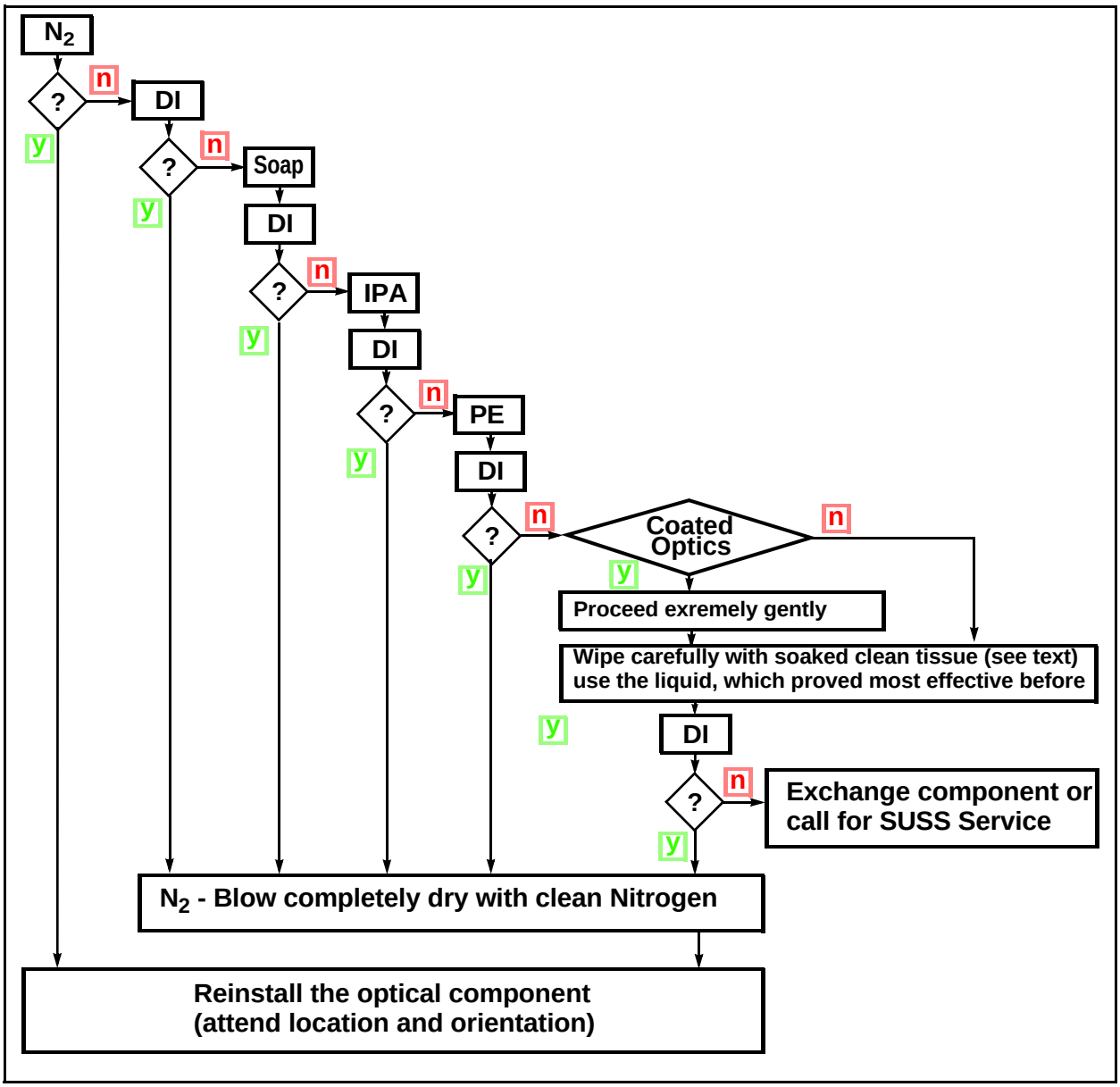
- Provide a clean laboratory table
- Have nitrogen blower with antistatic nozzle
- Prepare wash bottles with DI-water, detergent solution and solvent, and empty bowls for collecting the liquids.
- Prepare submersion bowls filled with DI-water, detergent solution and solvent.
- Supply gentle, clean cloths as described above.
- Prepare a box with a lid for safe collection of solvent soaked cloths (to prevent from self ignition).

2.6.3. Cleaning Procedure

Remove the optical component, which has to be cleaned, from the machine and note the orientation and exact location for later reinstallation.
Wet cleaning can be done - as appropriate - by rinsing of the liquid over the optical surface or by submersion of the optical component into the clean liquid.
Fingerprints or droplets of oil should be removed - as soon as they appear - in soap water.

See the flow diagram below for detailed cleaning procedure recommendation. In case of doubt about adequate clening call SUSS service in advance.

Note:
Solvent consuption should be kept to a reasonable minimum for environmental and safety reasons.



Legend to the cleaning procedure diagram:

N2 -	blow off dust (or droplets) with nitrogen
y/n -	check, if surface is clean (y=yes/clean; n=no/no success)
DI -	rinse with DI-water or submerge to DI-water (as appropriate for the component.
Soap -	rinse or submerge with detergent (1%) in DI-water.
IPA -	rinse or submerge with isopropanol alcohol
PE -	Petroleum ether (special light benzine)

For extremely obstinate contaminations petroleum ether can be used in addition to IPA.

If a treatment step has been nearly successful, but one cannot be satisfied completely by the result, repeat this step, prior to trying the next treatment step or solvent type.
When a cleaning procedure proved to be successful at an individual machine or production line, use always the same procedure and solvent when the optics of the identical machine needs cleaning again.

2.6.4. Safe Clean-up after Use of Solvents

- Do not mix different liquids.
- Cap each bin (bottle, bowl, can) securely.
- Restore all unused inventory to its safe-keeping.
- Dispose each used cleaning liquid according to company or local waste rules and regulations.
- Dispose soaked cloths accordingly.

2.6.5. Removal and Re-Insertion of Specific Optical Components

2.6.5.1. Handling of the Coldlight Mirror

In order to be able to clean the coldlight mirror properly, it must be removed from the lamp house.

Caution!

The coldlight mirror must be treated with the utmost care!

The orientation (coated face) of the coldlight mirror in the holder is critical if the mirror is marked at the side rim by an arrow. The tip of the arrow must be oriented to the lamp, because this is the coated face. When installing the mirror, make sure that the coated side is oriented toward the exposure lamp.
New mirrors without an arrow at the rim are coated on both faces (in doubt, check for identical reflection of both faces).
The brackets for holding the coldlight mirror should be tightened not too tightly in order to enable a thermal expansion of the mirror during operation.

Warning!

Do not touch the UV-lamp or the N2-cooling nozzle, when removing or installing the coldlight mirror. The lamp could be destroyed or lamp cooling could be affected.

For detailed advice see manual sections Lamp Exchange, Lamp Cooling and N2-Control!

Danger!

Special care is required at the lamp house 5000W, see resp. manual.

2.6.5.2. Handling of the Ellipsoid Mirror

For removal and installation of the ellipsoid mirror the UV lamp must be detached.

Warning!

For safe lamp handling insstruction see manual section lamp exchange, lamp cooling and N_2-Control!

Do not deadjust N_2-cooling nozzle!

To move out the mirror suport frame (in the 350W lamp house the mirror itself) the retaining screws must be removed.

Treat the reflecting surface with utmost care!

In reassembly watch for centering the mirror.

2.6.5.3. Lamp House Adjustments

The replacement and installation of the exposure lamp is described in the operator manual of the mask aligner.
The setting of the lamp, lamp house and socket cooling is also described in the operator manual of the mask aligner. There you will also find a list of the cooling data, related to the lamp type used.

2.6.5.4. Adjustment of the Optics

The description of the optical components and their exact position are found in the operator manual of the mask aligner.
The optical components are positioned in the beam path so that the uniformity and intensity are optimally set in the exposure plane. This adjustment is set in the factory and should only be changed on site and readjusted if necessary by a SUSS MircoTec service technician.

2.6.6. Conclusion

Remarks for the Optics Cleaning

1 Use clean, dry nitrogen as a first step to remove dust or particles.

2. Never wipe lenses with dry paper or tissue - this may cause scratches.

3. Never use abbrasive materials, e.g. dry leather wipers or dry cloths or polystyrene rods.

4. Always try Di-water for cleaning before using a solvent.

5. Never use acetone to clean any optical surface. It could be dissolved and destroyed. Never use acids or ammoniac for cleaning. Use only above recommended solvents.

6. Never use „Throw-away“ Q-tips because they contain contaminations.

7. Never use metal swabs you could scratch the optical surface.

8. Never try to disassemble combined optics and the inner optics of the microscopes.

9. Never soak optical components in solvents for an extended time.

2.7. Facts and Data for Maintenance and Service

2.7.1. Consumables

- The UV-lamp must be replaced, when it reaches the operation life time, as specified by the lamp manufacturer. (see section Lamp Replacement for details). Note that this time interval is specified for both features:
  - save lamp use with minimum risk of lamp explosion, and
  - intensity degradation within specified limit (mostly within 70% of original intensity). The specified time applies only for continuous use time with rare ignition events.

  If burning times are short and the lamp is ignited very often, the life time can be reduced to 50%. If a lamp is used outside its specification for cooling or the electric parameters, the time could be reduced dramatically !

- The electric connection wire of the lamp (anode wire) - and assembling materials like nuts - must be replaced, as soon as the surface of the contact points degrades and is no more perfectly conductive.
- The halogen microscope illumination lamp must be replaced when it has burned out (many 1000h). Replace only by the identical type.
- Vacuum seals on chucks or mask holders are sensitive and may be destroyed by fragments or by inadequate use. They must be replaced immediately when leaking.
- Contamination and degradation of photo masks depends highly on the exposure/contact modes used in different applications.
  Required cleaning or replacement intervalls must be tested by the user. SUSS does not supply photo masks.
- The elipsoid mirror has - because of its sensitive coating - a limited life time; generally it must be replaced after 2 to 5 years of use.
- For cleaning purposes solvents and tissues are required as described in the appropriate sections of the manuals.

2.7.2. Hazardous Materials and Solid Waste

Potentially hazardous materials used at the machine are (see also the Hazard Warning Section of this manual for more detailed description as well as for safety measures - especially the subsections Chemical Hazards and Mechanical Hazards):

- The UV lamp, which contains toxic Mercury (spilling at glass breakage), which is highly pressurized when hot, and which is extremely hot during lighting and for some time after switching off.
- Process materials - if toxic - classification of toxic material for his personnel is the responsibility of the user.
- Sharp broken fragments of process material.
- Liquid cleaning agents including used solvents and soaked tissues.

Solid waste resulting from machine use are:

- The UV lamp (containing mercury and to be disposed as special waste according to local regulations)
- the Halogen lamp,
- Cleaning material (refer to the appropriate section in this manual for more details).

2.7.3. Service Exchange of Heavy Subassemblies

The following subassemblies have been identified for special handling requirements, and must be dismounted, mounted and transported only by 2 persons:

- TSA (top side microscope), weighting 20 - 22 kg (6” or 8”);
- Lamp supply CIC1200, weighting 20 kg
- computer unit, weighting 28 kg.

2.7.4. Supplier’s Contact

See the last page of manuals (resp. last cover page of printed folders) for a list of SUSS units and representatives wordwide - valid at the time of manual publication.
For the latest contact list go to www.suss.com !

3 APPENDIX

3.1 Parameter Ranges and Default Settings

The table shows the range of values for parameters included in the main processes exposure and bonding.

Parameter	Description	Default value	Range of Values
Expose Type	Type of exposure	Soft	[Soft, Hard, Low Vac, Vac, Prox, Flood-E]
Exp. Time	Time of exposure	5.0 sec.	[0.1...999.9]
Wait Time	Pause between the expose cycles, using Multiple Exposure	10 sec.	[1...999,9]
Exp. Cycles	No. of cycles, using Multiple Exposure	3	[1...500]
Al. Gap	Alignment distance during the alignment	100 µm	[10...300]
Exp. Gap	Distance during the exposure in proximity	50 µm	[0...300]
HC-Wait Time	Time for N_2 purge under the wafer prior exposure	4 sec.	[0...30]
Pre Vac	Time of the pre-vacuum with reduced vacuum pressure	4 sec.	[0...30]
Full Vac	Time with full vacuum before exposing in vacuum contact	4 sec.	[0...30]
Vac Purge	N_2 purge time into the vacuum chamber after exposure	4 sec.	[0...30]
N_2 Purge Time [1]	N_2 purge time before exposure for exposing in N_2 atmosphere	4 sec.	[0...999]
N_2 Purge Gap [1]	Gap distance during N_2 Purge for exposing in N_2 atmosphere	30 µm	[0...1000]
WEC-Offset	Substrate position optional different to contact- respectively to 0-position	0 µm	[+/- 50]
WEC Type	Type of the Wedge Error Compensation	Cont	[Cont / Spacer / GlobCont [2] / GlobSpac [2]]
WEC delay	Time to get parallelism between substrate and mask	1 sec.	[0,1...120]
Spacer Thick	Thickness of the spacers	MA = 2000 BA = 100 µm	[50, 100, 125, 200, 1000, 2000]
Substrate Thick	Thickness of substrate using global WEC	500 µm	[10...3000]

Parameter	Description	Default value	Range of Values
Load Type	Load type of substrate(s)	Slide	[Slide / Fixture]
Unload Type	Unload type of the substrate(s)	Slide	[Slide / Fixture]
Clamp	Clamping of the substrates with or without spacers in between	with Spacers	[with Spacers, without Spacers]
Lower Sub.	Lower substrate is opaque or transparent	Glass	[Glass / Silicon]
Upper Sub. Thick [2]	Thickness of the upper substrate	500 µm	[0...2000]
Lower Sub. Thick [2]	Thickness of the lower substrate	500 µm	[0...2000]

[1] These parameters are only available with special optional hard- and software.
[2] These parameters are only available after activating the FUNCTION UNI-Bond.

3.2 List of Abbreviations

Θ	Theta rotation
Al. Gap	Alignment gap
AL400	Large gap alignment system
BA	Bond aligner
BSA	Bottom side alignment
BsSubPx	WEC with spacers beside substrate
CIC	Constant intensity controller
Cont	Contact
DIP	Mikro switch at microcontroller card
DVCU	Digital video control unit
E	Error message
Exp.	Exposure
Exp. T.	Exposure time
Flood-E	Exposure type: flood exposure(without mask)
F-WEC	Force-sensor WEC
GlobCont	Global WEC, contact mode
GlobSpac	Global WEC, spacer mode
GWEC	Global wedge error compensation
Hard	Exposure type: hard contact
Hard Ct	Exposure type: hard contact
HC Wait T.	Hard contact wait time
IR	InfraRed
ISA	Inter substrate alignment
L:F	Load the substrate by fixture
L:S	Load the substrate by slide
LED	Light emitting diode
Low Vac	Exposure type: low vacuum contact
Lvac-Ct	Exposure type: low vacuum contact
M.Pin	Middle pin
MA	Mask aligner
Mholder	Mask holder

3 Appendix

N2	Nitrogen
NFH	Near field holography
P	Purge (nitrogen)
Pgm.	Program
Pre. Vac	Pre vacuum
Prox	Exposure type: proximity
S	Substrate (square or irregular shape)
SBSA	Single bottom side alignment
Soft	Exposure type: soft contact
Soft-Ct	Exposure type: soft contact
STG	stage
SW	software
TH	Theta
Tri-B	Triple stack bonding
TSA	Top side alignment
Type A	A type of chuck for anodic bonding
Type B	A type of chuck for silicon to silicon pre bonding
U:F	Unload substrate by fixture
U:S	Unload substrate by slide
Vac	Exposure type: vacuum contact
Vac-Ct	Exposure type: vacuum contact
W	Round wafer
WEC	Wedge error compensation
Xl, Xr	X-coordinate, left/right objective
Yl, Yr	Y-coordinate, left/right objective
Z	position of substrate/wafer relative to mask 0 means contact

3.3 Spare Parts Llist (Extract)

167330	**SUSS MA6/BA6 MASK- UND BONDALIGNER STANDARD**
106969	**ALIGNMENT STAGE MA6/BA6**
111609	Z-STROKE MA6/BA6
130727	SPINDLE
158792	COMBINATION MOTOR 3557 + ALTERNATOR HEDS 5500 A+CABLE
144845	TOOTHED BELT T 2,5 Z 152 B 6 L 380
111654	**WEDGE ERROR COMPENSATION HEAD MA4/6-BSA**
124500	GLAS CYLINDER DIA12
152106	O Ring NBR 769-9x1,5
152192	O Ring NBR 769-127x2
152168	O Ring NBR 769-110x2
152254	O Ring NBR 769-95x2
130086	COMPRESSION SPRING
125370	BRAKE SCREW
153042	GROOVED BALL BEARING
172959	TENSION SPRING
150896	L SWIVEL CONNECTION M5 FOR HOSE 5X1
152095	O-RING 015.30X002.40 72 NBR/872
146113	PROXIMITY SWITCH/IND/NPN/7X45
119243	COMPRESSION SPRING
119242	TENSION SPRING 0.5X3X12
150910	L-BANJO L M5 4X1 MOVEABLE BANJO FITTING
150893	DISTRIBUTOR FOR HOSE M5X1
111615	**X-Y-Θ-STAGE MA6/BA6**
112023	GUIDE LINEAR AXIS ROTATION
149807	PROXIMITY SWITCH/IND/NPN/S/2.0/8X8X20
152438	TENSION SPRING
149807	PROXIMITY SWITCH/IND/NPN/S/2.0/8X8X20
158792	COMBINATION MOTOR 3557+ALTERNATOR HEDS 5500 A +CABLE
112011	**STAGE CASING MA6/BA6**
144859	MICROMETER SCREW, 20MM, ADJUSTMENT X-Y-TRAVEL
143761	MICROMETER SCREW, 25MM, ADJUSTMENT ROTATION
144169	COUPLING MASTER SELFSEALING RED M5 R1/8"
150909	L-SWIVEL CONNECTION M5 FOR HOSE 4X1
150896	L SWIVEL CONNECTION M5 FOR HOSE 5X1
150922	SCREWED PLUG CONNECTION FOR HOSE 4X1
150893	DISTRIBUTOR FOR HOSE M5X1
150910	L-BANJO L M5 4X1 MOVEABLE BANJO FITTING
150892	CONNECTION M5 SW7 L11.5
150906	L-CONNECTION

149762	PROXIMITY SWITCH/IND/PNP/S/0.6/3X22/LED
111650	**TRANSPORT SLIDER MA6/BA6**
134111	CYLINDER
150899	REDUCING NIPPLE R 1/8" M5 SW 14
150892	CONNECTION M5 SW7 L11.5
150897	L-SWIVEL CONNECTION M5 7X11.5X11
150894	HOSE COUPLING M5 FOR HOSE 5X1
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
129890	RUBBER LIP MA4-III
150893	DISTRIBUTOR FOR HOSE M5X1
112021	**HOSE REEL FOR MA6/BA6 CHUCK STAGE**
150908	HOSE PVC DIM.3/5/1
112026	SENSOR X-Y-Q-STAGE
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
150896	L SWIVEL CONNECTION M5 FOR HOSE 5X1
169609	**BASIC ASSEMBLY MA6/BA6 CPL. BASE PLATE 40MM**
108347	**PNEUMATIC BLOCK MA6/BA6**
150906	L-CONNECTION
150920	SOLENOID VALVE NW1/8BAR/24V 65.127
150940	THROTTLE VALVE M5 SW12
150921	THROTTLE-BACK-PRESSURE VALVE 0.5BAR 10X20X22
151085	PRESSURE REGULATOR O-21 BAR
151203	PRESSURE SWITCH TYPE UPS-1K
150892	CONNECTION M5 SW7 L11.5
150903	CONNECTION COUPLING M5 SW7 LG10
150895	T-SWIVEL CONNECTION M5 14X7X11.5
150897	L-SWIVEL CONNECTION M5 7X11.5X11
150914	T-SWIVEL CONNECTION M5 FOR HOSE 4X1
150922	SCREWED PLUG CONNECTION FOR HOSE 4X1
150894	HOSE COUPLING M5 FOR HOSE 5X1
150926	T-FITTING 52.050
151024	CROSS PLUG CONNECTION M4 FOR HOSE 4X1
150947	L-PLUG CONNECTION 2X FOR HOSE 4X1
150902	DOUBLE NIPPLE MALE/MALE
150930	T-CONNECTION 3XM5 12X14X8
150907	HOSE 4X0.65 POLYAMIDE
111675	**FRONT PANEL RIGHT**
135073	MANOMETER 1-0BAR
135072	MANOMETER 0 -1 BAR
160967	MANOMETER 0 -4 BAR
160966	MANOMETER 0 -10BAR

151430	PRESSURE REGULATOR 0-1 BAR
162324	POTENTIOMETER WIRE BOUND 10KOHM
149878	PRECISION POTENTIOMETER 100 KOHM
159913	SWITCH - SPLITFIELD
159914	SWITCH - BSA/IR
159912	SWITCH - MAGNIFICATION BSA
149987	SWITCH - ILLUMINATION - ON/OFF
149988	SWITCH- OPENER
149989	SWITCH - SHUTTER
150906	L-CONNECTION
150940	THROTTLE VALVE M5 SW12
150903	CONNECTION COUPLING M5 SW7 LG10
150922	SCREWED PLUG CONNECTION FOR HOSE 4X1
135069	PRESSURE REGULATOR 0-1 BAR
150937	T-SWIVEL CONNECTION
150914	T-SWIVEL CONNECTION M5 FOR HOSE 4X1
150924	OUTLET RESTRICTOR 47.200
150895	T-SWIVEL CONNECTION M5 14X7X11.5

166666	**BASE PLATE CPL. MA6/BA6**
149992	MUSHROOM BUTTON WITH KEY
149993	SWITCH
108278	MAINS WIREING MA6/BA6
150068	MAIN SWITCH T3-1-102/EA/SVB-SW
158611	PROTECTIVE CIRCUIT BREAKER PROPAK 4A/250VAC 2POLAR PHB22-A8-SX-22-H-A-4-2
150906	L-CONNECTION
151107	SCREWED PLUG CONNECTION
150922	SCREWED PLUG CONNECTION FOR HOSE 4X1
150914	T-SWIVEL CONNECTION M5 FOR HOSE 4X1
151089	PNEUMATIC ELECTRONIC SWITCH
150899	REDUCING NIPPLE R 1/8" M5 SW 14
150917	PRESSURE REGULATOR R1/8" 0-7BAR

108277	**ELECTRONIC RACK MA6/BA6**
113824	PC-BOARD MOTOR CONTROL MA6/BA6
146453	FUSE SLOW BLOW 3.15A DIN 41571
114307	PC-BOARD MICROCONTROLLER 8BIT BANKING
150750	SWITCH
166757	ELECTRONIC MODULE INSERT MA6/BA6
114142	PC-BOARD DISTRIBUTOR PLATE BA6
146453	FUSE SLOW BLOW 3.15A DIN 41571
146876	FUSE SLOW BLOW 2.0A DIN 41571

163001	**SPARE PART KIT FOR MASKALIGNER MA6 / MA8 B A6 MJB3**
146449	FUSE SLOW BLOW 1A DIN 41571

146876	FUSE SLOW BLOW 2.0A DIN 41571
146453	FUSE SLOW BLOW 3.15A DIN 41571
146455	MICROFUSE 10A SLOW DIN 41571
152100	O-RING 3 X 1
146847	FUSE-SLOW BLOW 1.0A US-N 6.3X32MM
146845	FUSE-SLOW BLOW 5.0A US-N 6.3X32MM
146838	FUSE-SLOW BLOW 0.5A DIN 41571
146837	FUSE-SLOW BLOW 5 A DIN 41571

158036	**ADAPTION KIT FOR MASK HOLDER MA6/BA6/M-7**
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
107024	TOPSIDE MICROSCOPE STAGE MA6/BA6
111677	MICROSCOPE SUPPORT
151174	FLOWMETER
151130	REDUCING NIPPLE R1/4"/M5
150906	L-CONNECTION

107001	**MICROSCOPE MANIPULATOR MA6/BA6**
112020	X-Y-TSA-MANIPULATOR
158792	COMBINATION MOTOR 3557+ALTERNATOR HEDS 5500 A +CABLE
114171	AG ELECTRONIC PARTS TSA MIKROSKOP MA6/BA6
113824	PC-BOARD MOTOR CONTROL MA6/BA6
146453	FUSE SLOW BLOW 3.15A DIN 41571
158792	COMBINATION MOTOR 3557+ALTERNATOR HEDS 5500 A+CABLE
143719	RUBBER BUFFER, 55 SHORE A, 2 FEMALE THREADS
145011	COUPLING
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40

112025	**Z-MOVEMENT MICROSCOPE MA6/BA6**
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
150899	REDUCING NIPPLE R 1/8" M5 SW 14
150923	THROTTLE-BACK PRESSURE VALVE M5
151385	PNEUMATIC CYLINDER/PD-63/ST-50/DA/SSC/ CUS
150974	PNEUMATIC CYLINDER/PD-8/ST-25/SA
150918	VALVE M5 SW9 LG21.5 0.5BAR
150922	SCREWED PLUG CONNECTION FOR HOSE 4X1
150937	T-SWIVEL CONNECTION
150939	Y-PLUG DIA 4 F. HOSE 4X1
150945	PLUG CONNECTION 2X FOR HOSE 4X1

157467	**CARRIERUNIT MOVABLE LH350/LH1000 MA6/BA 6**
111713	HOLDER MIRROR/LAMP HOUSE MA6/BA6
112003	PNEUMATIC TRANSPORT
151317	PNEUMATIC CYLINDER/PD-16/ST-200/DA/CUS
151171	COUPLING FLEXIBLE FK-M 6
150906	L-CONNECTION

150947	L-PLUG CONNECTION 2X FOR HOSE 4X1
150907	HOSE 4X0.65 POLYAMIDE
146113	PROXIMITY SWITCH/IND/NPN/7X45
111006	LIMIT STOP
144277	DAMPING ELEMENT FA 1010 D3 MIRROR HOUSE
111031	MIRROR HOUSE SLIDE
111006	LIMIT STOP
144277	DAMPING ELEMENT FA 1010 D3 MIRROR HOUSE
100480	POSITIONINDICATOR
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
111712	**CARRIAGE EXPOSURE UNIT MA6/BA6**
146113	PROXIMITY SWITCH/IND/NPN/7X45
151386	PNEUMATIC CYLINDER/PD-20/ST-5/SA/CUS/POS
150906	L-CONNECTION
	BOTTOMSIDE MICROSCOPE
112420	MICROSCOPE MANIPULATOR MA6/BA6
159207	MOTORCOMBINATION
146062	PROXIMITY SWITCH/IND/NPN/S/1.5/8X8X40
145033	TOOTHED BELT T 2,032/Z100/B4 L203,2
144804	TOOTHED BELT T 2,032 Z 90 B 4 L 182,88
112318	BSA-MICROSCOPE ILLUMINATION
146066	LAMP 6V/15W
	TSA-MICROSCOPE ILLUMINATION
148649	LAMP HALOGEN 13.8V/85W
171554	FAN 12V AC
	EXPOSURE OPTIC - ELLIPSOIDAL REFLECTORS
145525	ELLIPSOIDAL REFLECTOR LH350
130415	ELLIPSOIDAL REFLECTOR LH1000
130416	ELLIPSOIDAL REFLECTOR LH1000 - HP
	EXPOSURE OPTIC - COLD LIGHT MIRRORS
	OPTIK UV250
169678	COLD LIGHT MIRROR UV-250 - LH 350
169724	COLD LIGHT MIRROR UV-250 - LH 1000
	OPTIK UV300
172414	COLD LIGHT MIRROR UV 300 - LH 350
172410	COLD LIGHT MIRROR UV 300 - LH 1000
	OPTIK UV400
172412	COLD LIGHT MIRROR UV 400 - LH 350
169446	COLD LIGHT MIRROR UV 400 - LH 1000
	DIVERSION MIRRORS
124463	DIVERSION MIRROR UV400 - LH 1000

130597	DIVERSION MIRROR UV 400HP
106970	EXPOSURE UNIT MA6/BA6/350W
106538	LAMP HOUSE 350W MA6/BA6
110189	SHUTTER LAMPHOUSE COMPLETE
107022	EXPOSURE UNIT MA6/BA6/1000W
106174	LAMP HOUSE 1000W MA6/BA6
111016	SHUTTER LAMPHOUSE COMPLETE

EXPOSURE LAMPS

146049	LAMP HG-350W/S OSRAM
182538	LAMP USH 350DS USHIO
148979	LAMP HG-XE500W USHIO
148959	LAMP HG-1000W OSRAM
169776	LAMP USH-1000 KS USHIO

3.4 Lock-Out / Tag-Out Checklist

Lock-Out/Tag-Out Checklist

Lock-out/tag-out is an essential safety procedure that protects workers from injury while working on or near electrical circuits and equipment. Lock-out involves applying a physical lock to the power source(s) of circuits and equipment after they have been shut off and de-energized. The source is then tagged out with an easy-to-read tag that alerts other workers in the area that a lock has been applied.

In addition to protecting workers from electrical hazards, lock-out/tag-out prevents contact with operating equipment parts: blades, gears, shafts, presses, etc.

A worker was replacing a V-belt on a dust collector blower. Before beginning work, he shut down the unit at the local switch. However, an operator in the control room restarted the unit using a remote switch. The worker's hand was caught between the pulley and belts of the blower, resulting in cuts and a fractured finger.

When performing lock-out/tag-out on machinery, you must always lock out and tag out ALL energy sources leading to the machinery.

Also, lock-out/tag-out prevents the unexpected release of hazardous gasses, fluids, or solid matter in areas where workers are present.

An employee was cutting into a metal pipe using a blowtorch. Diesel fuel was mistakenly discharged into the line and was ignited by his torch. The worker burned to death at the scene.

All valves along the line should have been locked out, blanked out, and tagged out to prevent the release of fuel. Blanking is the process of inserting a metal disk into the space between two pipe flanges. The disk, or blank, is then bolted in place to prevent passage of liquids or gasses through the pipe.

When performing lock-out/tag-out on circuits and equipment, you can use the checklist below.

- ✔ Identify all sources of electrical energy for the equipment or circuits in question.
- ✔ Disable backup energy sources such as generators and batteries.
- ✔ Identify all shut-offs for each energy source.
- ✔ Notify all personnel that equipment and circuitry must be shut off, locked out, and tagged out. (Simply turning a switch off is NOT enough.)
- ✔ Shut off energy sources and lock switchgear in the **OFF** position. Each worker should apply his or her individual lock. Do not give your key to anyone.
- ✔ Test equipment and circuitry to make sure they are de-energized. This must be done by a qualified person.*
- ✔ Deplete stored energy by bleeding, blocking, grounding, etc.
- ✔ Apply a tag to alert other workers that an energy source or piece of equipment has been locked out.
- ✔ Make sure everyone is safe and accounted for before equipment and circuits are unlocked and turned back on. Note that only a qualified person may determine when it is safe to re-energize circuits.

*OSHA defines a "qualified person" as someone who has received mandated training on the hazards and on the construction and operation of equipment involved in a task.

3 Appendix

3.5 Schematics of the Pneumatic System

Description	Schematic	Pages
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	5 of 8	75
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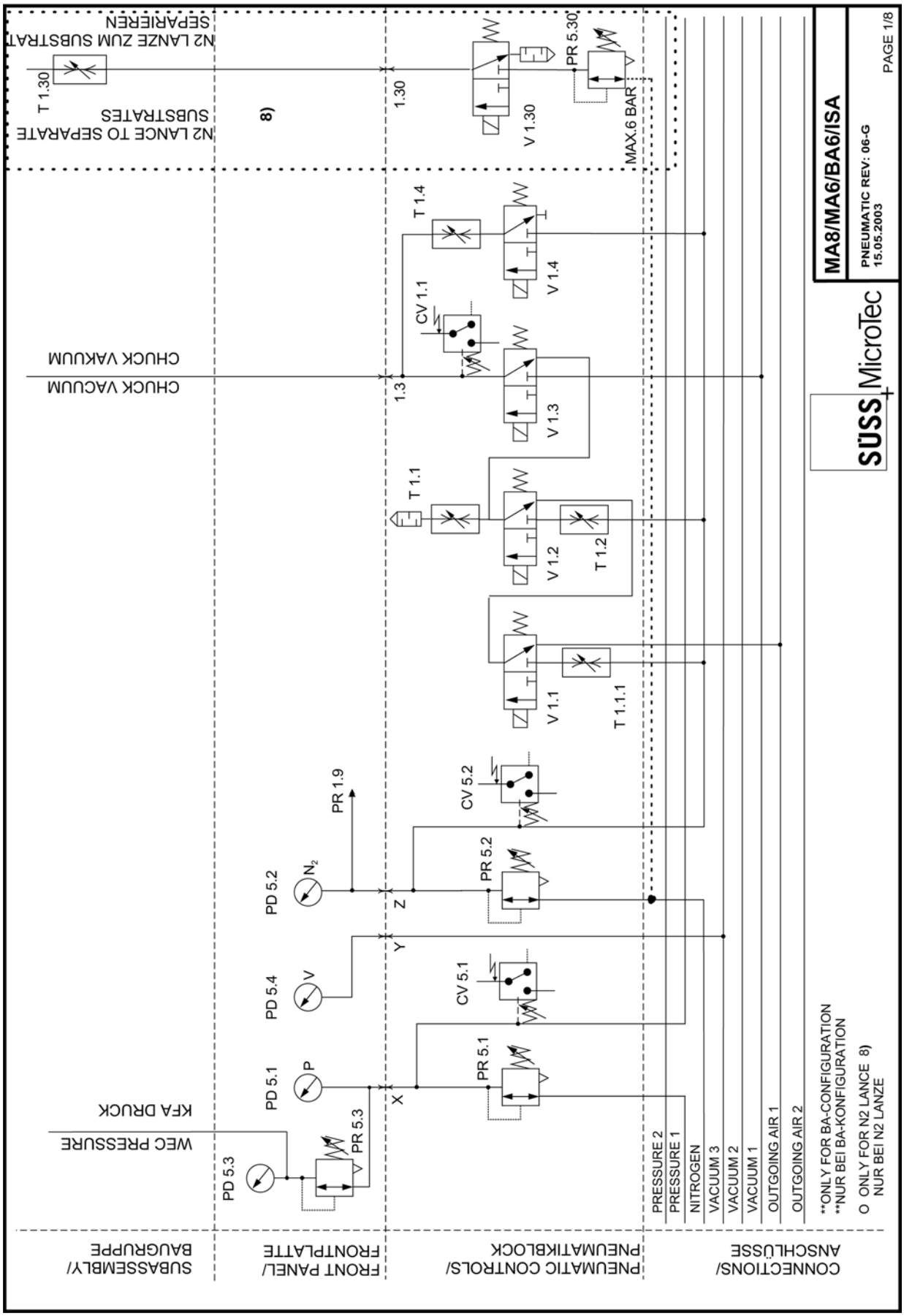

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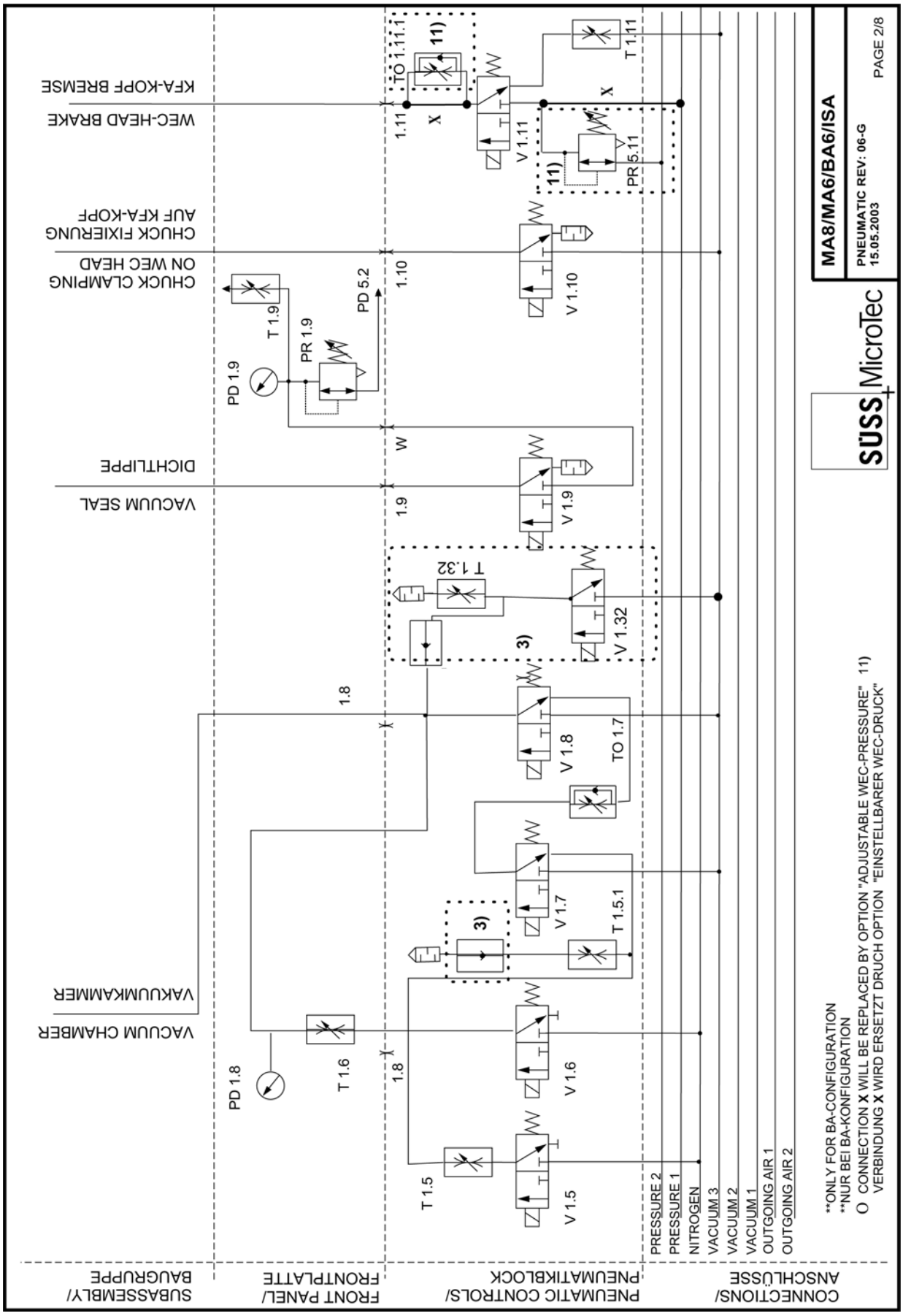

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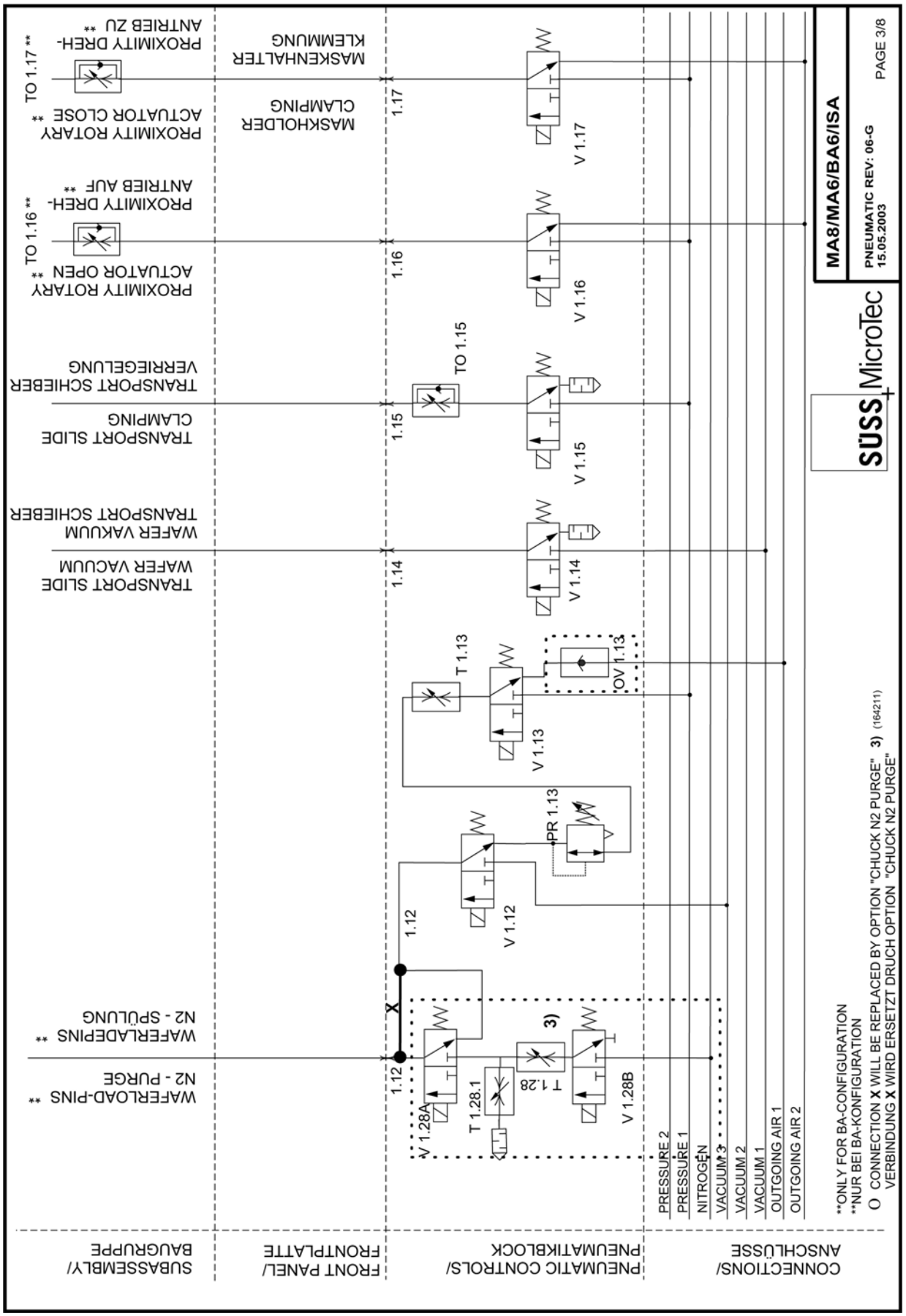
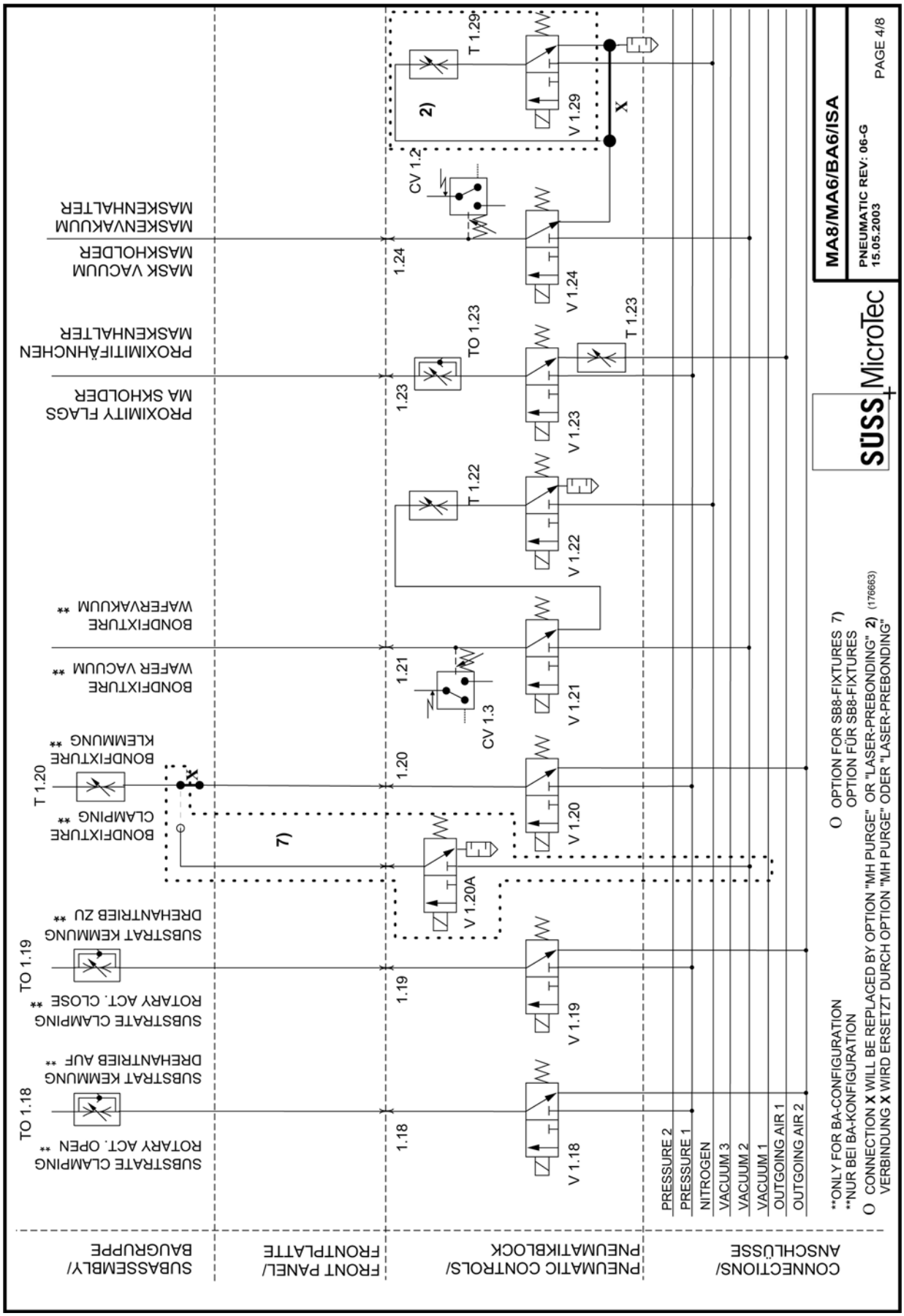
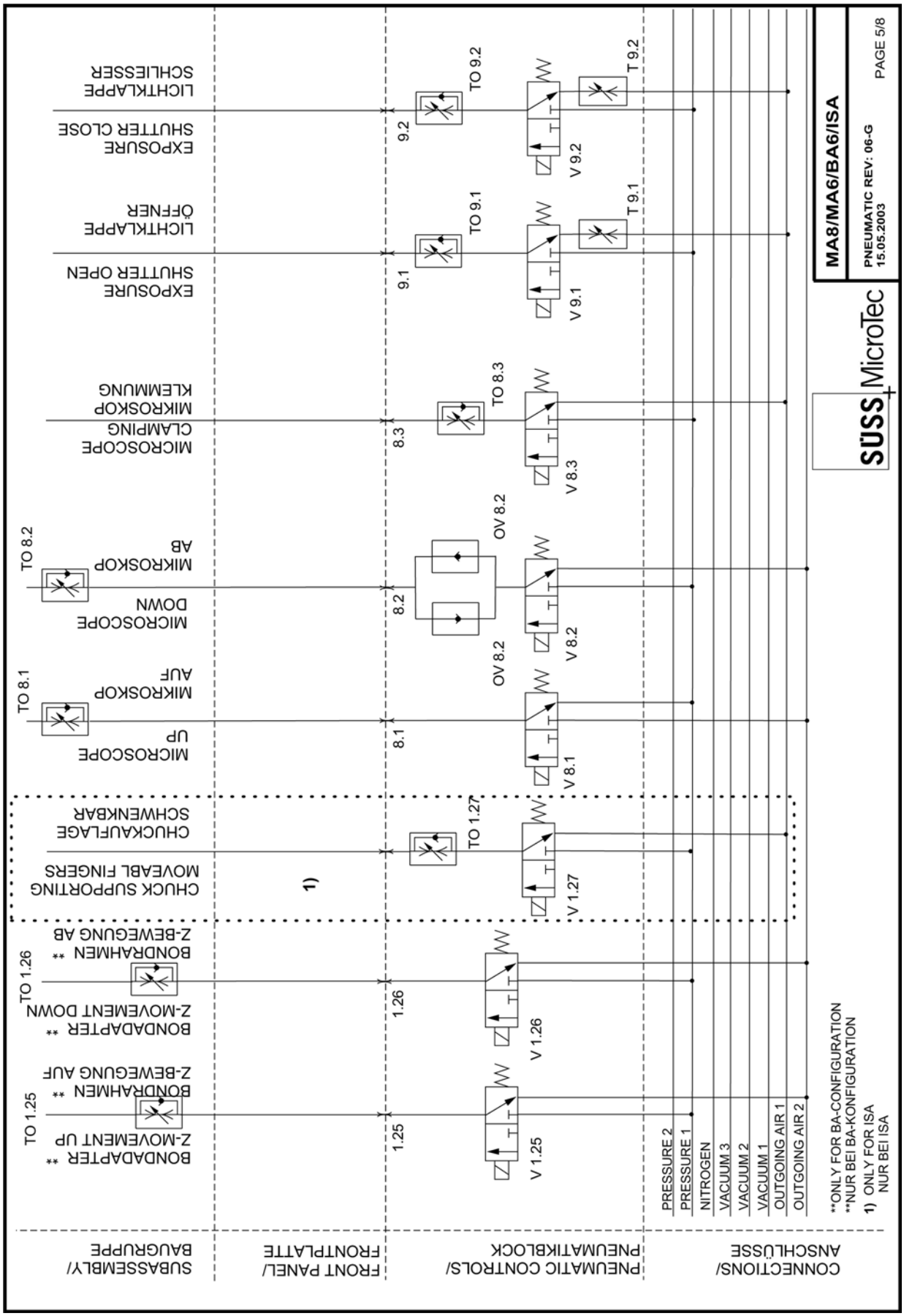


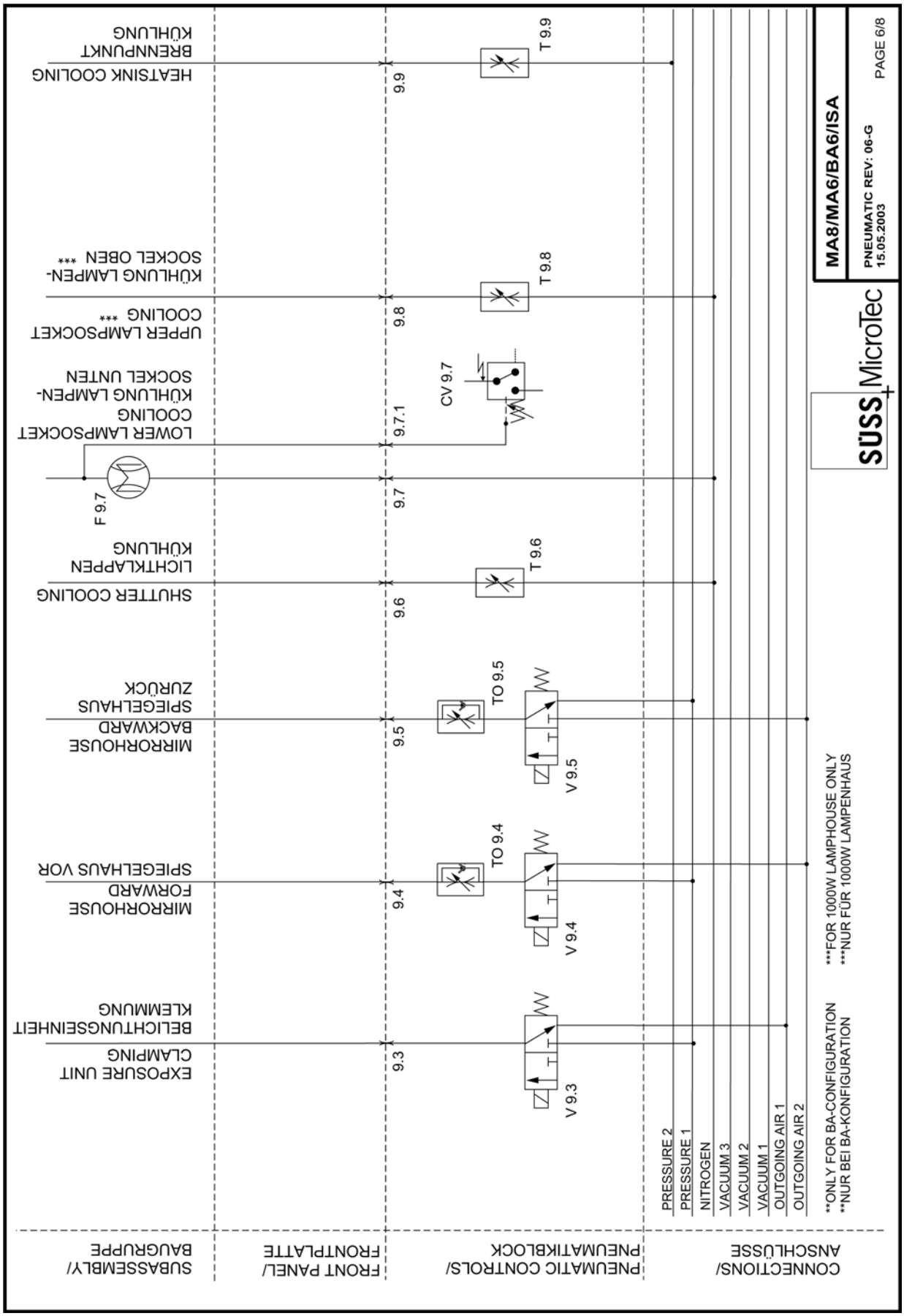
Pneumatic Plan, Rev: 06-G, Sheet 4 of 8



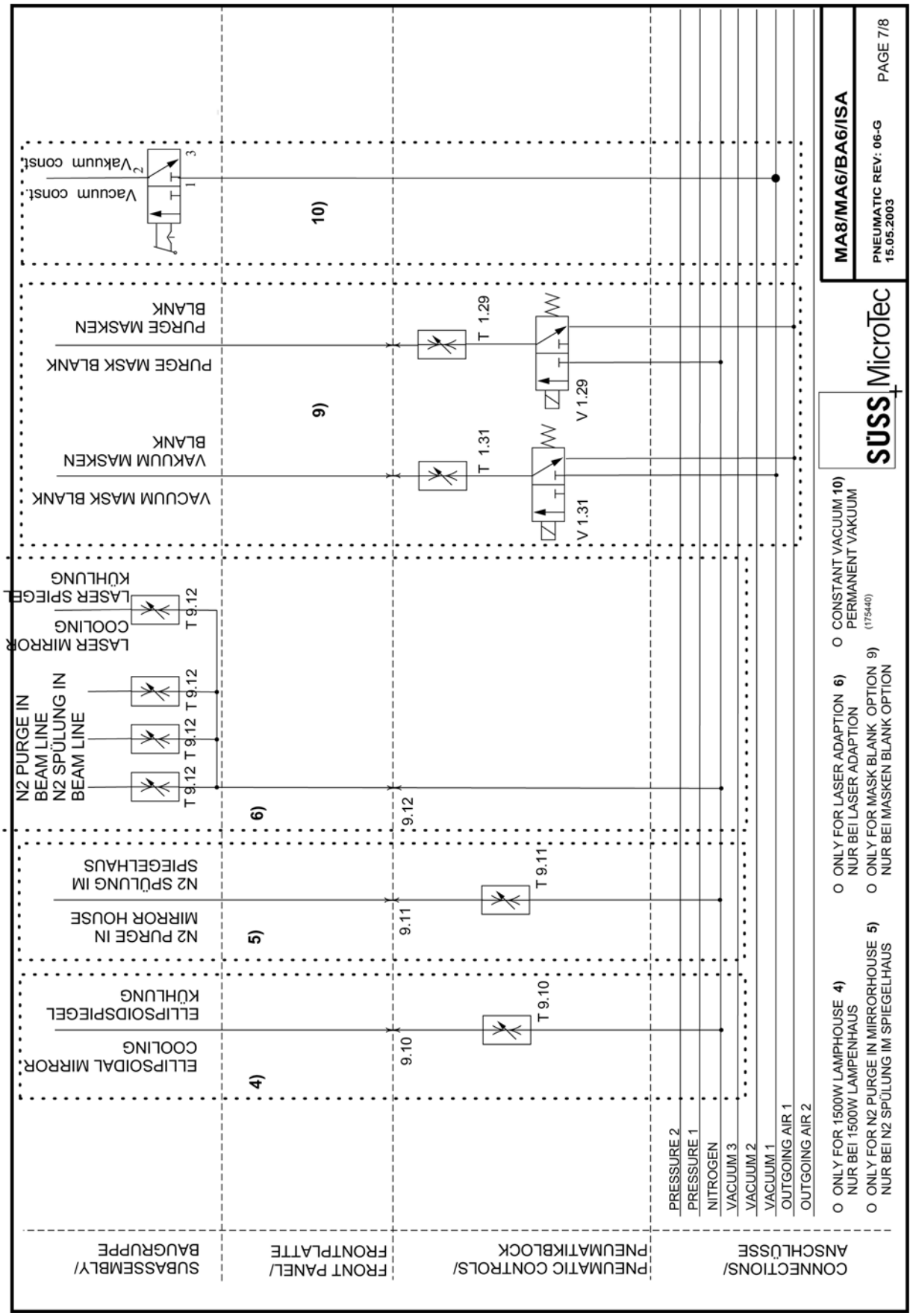
Pneumatic Plan, Rev: 06-G, Sheet 5 of 8



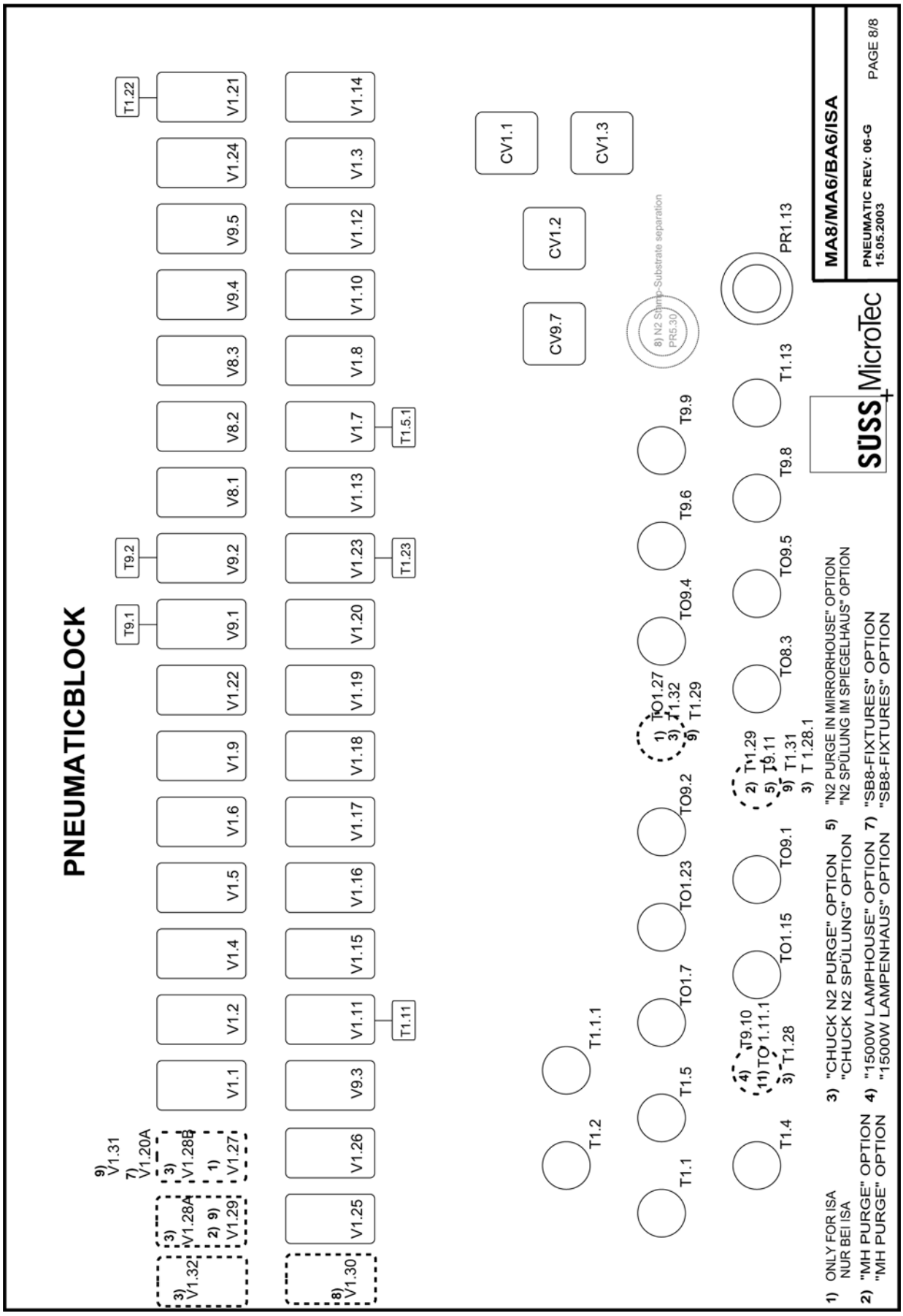
Pneumatic Plan, Rev: 06-G, Sheet 6 of 8



Pneumatic Plan, Rev: 06-G, Sheet 7 of 8



Pneumatic Plan, Rev: 06-G, Sheet 8 of 8



3.6 Schematics of the Electronic System MA6/8 BA6/8

Item	Description	Assembly #	Schematic	Page
1	Mains connection	108278	103501	3 pages
2	N2-loss/interlock module	114170	103506	
3	Microscope illumination	114162	103400	
4	Cable microscope illumination, lamp house	113369	102451	
5	Front panel	114156	103505	
6	Keyboard	114145	103490	
7b	Junction board, standard	114142	182459	
7c	Junction board, with NFH, mot. stage, sep. knife	173828	173829	
8	Auxilliary PCB	168638	168697	
9a	Backplane, standard	114143	103488	
9b	Backplane, mot. stage/ separation knife	168687	168688	2 pages
10	Electronic rack	108277	103500	
11	Extension cable junction board-cards	149754	182253	
12	Microcontroller, 8 bit	174850	174851	
13	Output card	113775	103207	
14	Input card	113764	103225	
15a	Motor driver card, 2 channel	113824	103236	
15b	Motor driver card, 4 channel	166225	167593	
16	Alignment stage	114197	103508	
17	Pneumatic	108347	182458	
18	TSA microscope manipulator	114171	103485	
19	BSA stage	114173	103388	
20	Exposure unit	114169	103394	
21	Microscope M204/234+AL300, focus left	111835	103571	
22	Microscope M204/234+AL300, focus right	111836	103571	
23	Cable TSA focus left/right, AL300	114054	103373	
24	Microscope BSA right	159309	162968	
25	Microscope BSA left	159308	162969	
26	Cable BSA focus left/right, AL300	114053	103468	
27	Extension cable BSA focus left/right	160209	160707	
28	Extension cable BSA magn. choice left/right	160210	160708	
29	Cable focus controller - microscope	181729	181743	
30	Cable adaption frame grapper	181719	182456	
31	Cable data exchange - EISS	181725	181741	

3 Appendix

Frontplatte / front panel (103505 Bl. 1 / D3...H3)

Bl. 02 / B2

PE- Terminalblock -X1

Lamphouse
X8 (DVCU-Netzausgang)
Rückwand / backpanel
Z1 Filter
X10 Lamp Powersupply CSE
X 10A
X9 (Elektronik-Rack)
Frontplatte links / left

-X1

-X3

-X4

-X5

-X6

-X8

-X9

-X10

-X10A

-F1 *

-F2

-F3

-F4

-F5

-Q2

-Q3

-Z1

-J9

-J10

-J13

-J25

-J29

-J38

-A1

P-Supply

Illum

Mains

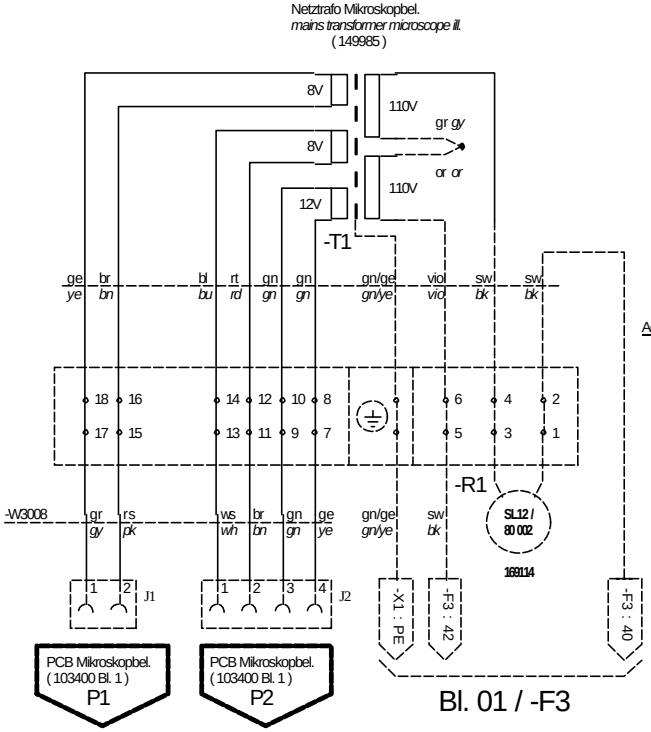
* Energized also when EMO is activated !!!

alle Schutzleiter, sofern nicht anders bezeichnet : LiY 2,5
all grounding wires - if not individually marked
- gn/ge / gn/ye : 150873

alle sonstigen Kabel, sofern nicht anders bezeichnet : AWG14
all other wires - if not individually marked
- sw / bk : 157491

Rev.	Änderung	Datum	Name
14	Anschluß -A1 neu	08.05.06	M.Hoppe
13	F6 entf./Ansch.A1,X10A neu, Bezeichnungen	10.08.05	M.Hoppe
12	+P9 +P10 F38	26.09.01	jj
11	-Rev10 und +X10A +F6	25.06.01	fg
10	-R2 und +Heissleiter	21.07.00	fg
09	-ESB -R1 und +Heissleiter	02.07.99	fg

Machine: MA/BA6	Title: Base Wiring Groundplate		
DrawingNo.: 103501	Rev.: 14	AssemblyNo.: 108278	
Size : A4	Date : 8-May-2006	Sheet 1 of 3	
Drawn by:	File : .DOC_FILE_NAME_NO_PATH	SUSS MicroTec	



Aderendhülsen / end splices :

- or / or : 0.5 (149275)
- ws / wh : 0.75 (149277)
- ge / ye : 1.0 (149277)

Aderendhülse
end splice

-X2

1 x Klemme gn/ge / term. block gn/ye (149393)
9 x Klemme gr / term. block gy (149392)
1 x Sicherungsklemme / fuse terminal (161675)

12	J1, J2	26.9.01	jla
11	- Rev 10 / + X10A u. F6	5.06.01	lge
10	+ Heißleiter -R2	21.07.00	lge
09	-ESB / + Heißleiter -R1	2.07.99	lge
08	+ESB und F-Automat	8.04.99	lge
07	+ESB	8.04.99	lge

Kabelliste für Bgr. Grundverdrahtung zum Stromlaufplan

Kabel Nr.	Kabeltyp	EDV-Nr.
-W1001	Netzleitung 3 x 1,5	147357
-W1002	Netzleitung 3 x 0,75	146474
-W3001	LiYY 7 x 0,25	148614
-W3002	Ruflakabel 10pol.	149784
-W3003	Sondenkabel 2 x 0.14	keine
-W3004	LiYY 4 x 0.5	146089
-W3005	LiYY 2 x 0.5	146405
-W3006	LiYY 5 x 0.25	146407
-W3007	LiYY 2 x 0.5	146405
-W3008	LiYY 6 x 1.0	150824
-W5001	LiYY 4 x 0.25	146406

Rev.	Änderung	Datum	Name
12	diverse in Plan 01 + 02	26.09.01	jla
11	- Rev.10 / + X10A u. F6	5.06.01	lge
10	+ Heißleiter -R2	21.07.00	lge
09	-FSB / + Heißleiter -R1	2.07.99	lge
08	+FSB und F-Automat	8.04.99	lge
07	+FSB	8.04.99	lge

Machine: MA/BA6

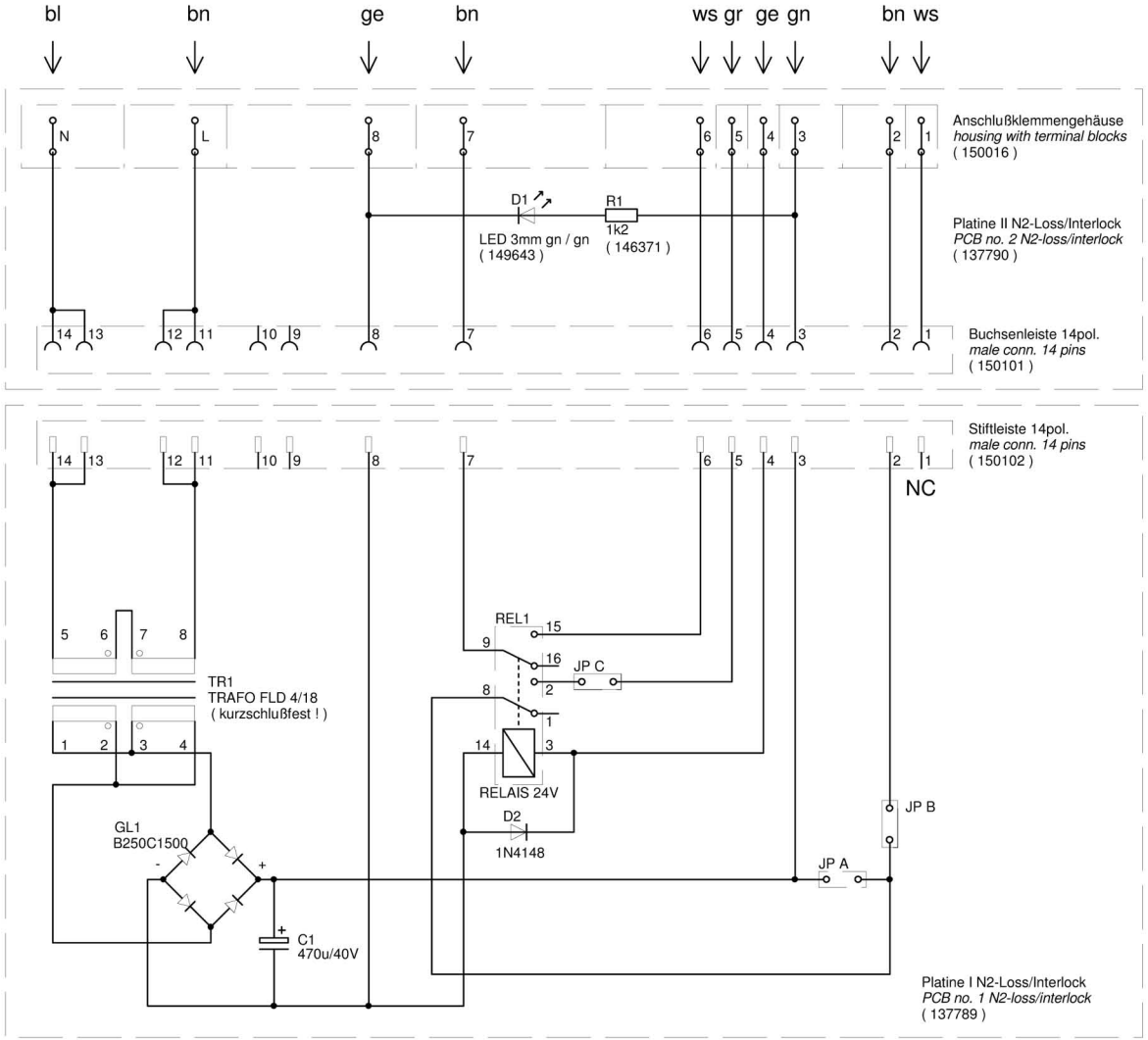
Title: Base Wiring Groundplate assy. mains connection

DrawingNo.: 103501 **Rev.:** 12 **AssemblyNo.:** 108278 **Rev.:** 13

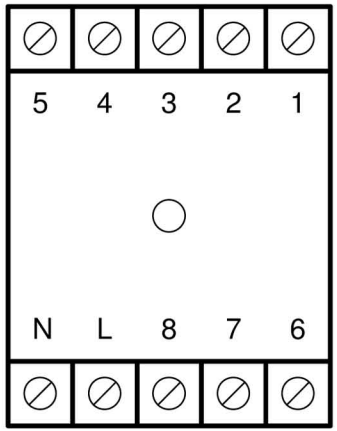
Size : A4_l **Date :** 12-Aug-2005 **Sheet** 3 of 3

Drawn by: J.Wanning **File :** .DOC_FILE_NAME_NO_PATH

Error : \\Augustus\Programme\Design Explorer 99 SE\Syste



114193



für Betrieb ohne Timer-Relais :

- Timer-Relais (nicht eingezeichnet) und Brücke JP A nicht einsetzen
- Brücken JP B und JP C einsetzen

Anmerkung :

statt der eingezeichneten Jumper werden Codierdrahtbrücken eingelötet !

114248

Rev.	Änderung	Datum	Name
02			
01	TR1 kurzschlußfest statt F 09/1995	28.05.1996	R. Klüsener

Machine: **MA6/BA6**

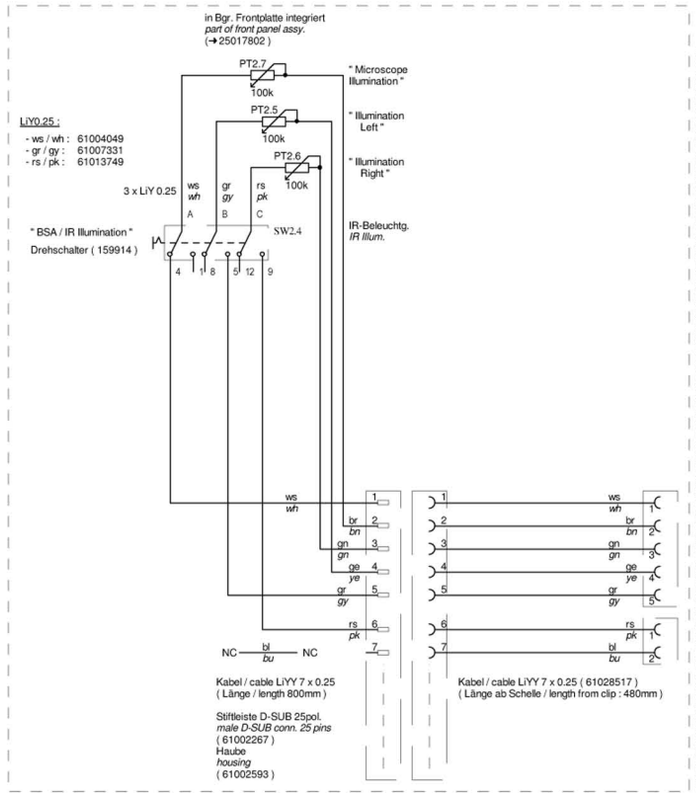
Title: **Bgr. N2-Loss/Interlock-Modul assy. N2-loss/interlock module**

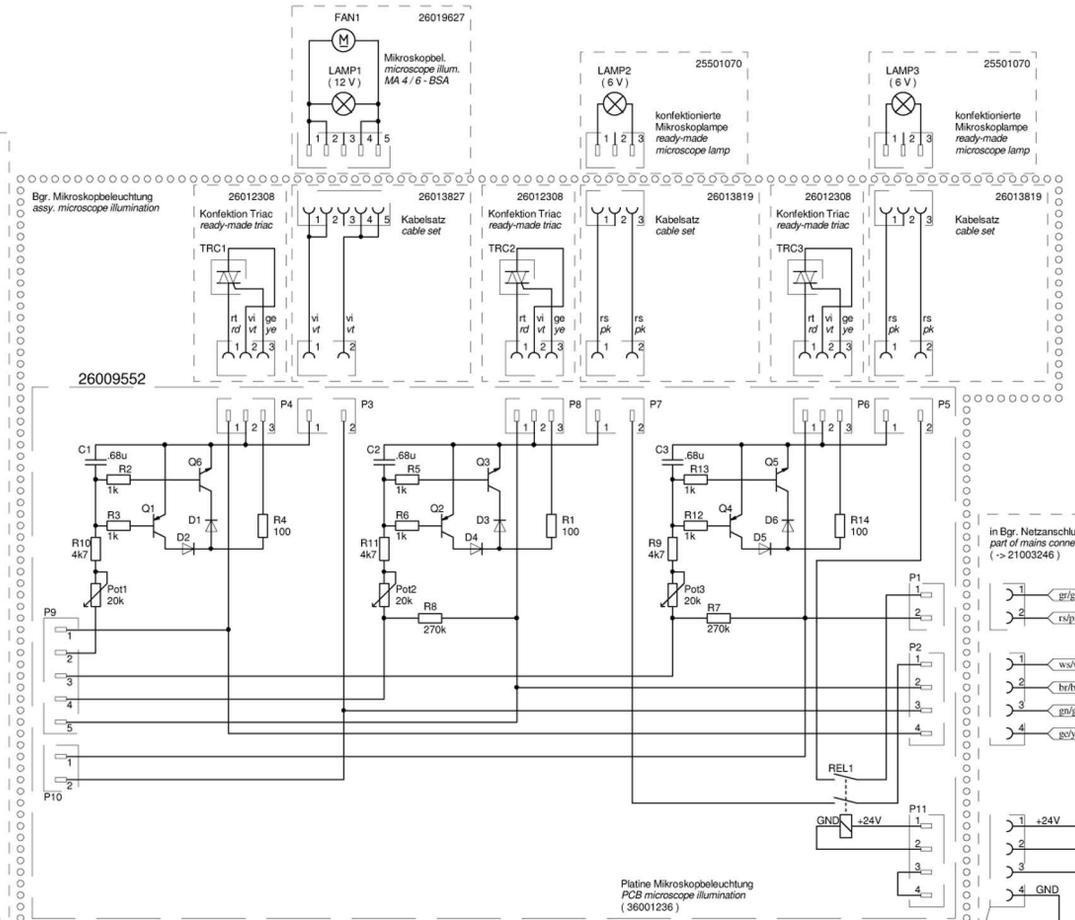
Drawing number: **103506** Rev: **02**

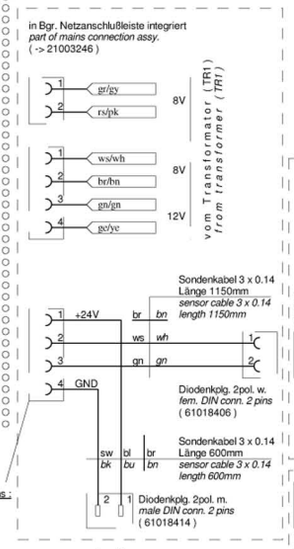
Assy. number: **114170** Rev: **02**

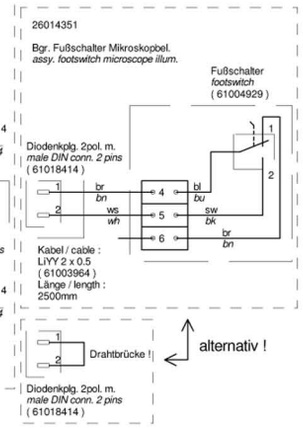
Drawn by: J. Wanning | Date: 18.09.1995 | Size: A4 | Sheet 1 of 1 | File: 103506R02.sch

SUSS MicroTec Karl Suss









D1..D6 = 1N4003
Q1, Q2, Q4 = BC327
Q3, Q5, Q6 = BC337
TRC1..TRC3 = 2N6348

Miniaturbuchsenstecker 4pol. / female miniature connector 4 pins :
- 1 x Steckergehäuse / connector housing (61034916)
- 4 x Kontaktbuchse / contact shoe (61034932)

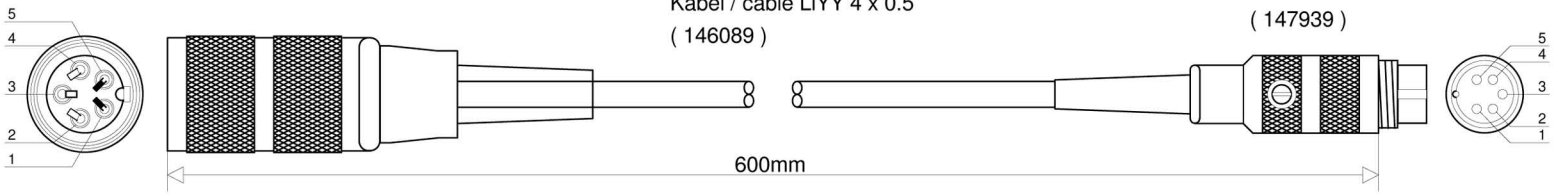
Rev.	Änderung	Datum	Name
04	Q2,4 3 Ebenen	15.4.99	Ige
03	Anschl. PT2.5,PT2.6	7.12.1997	R. Küsel
02	Anschl. Frontplatte	4.12.1996	R. Küsel
01	Fußschalter	04.12.1995	R. Küsel

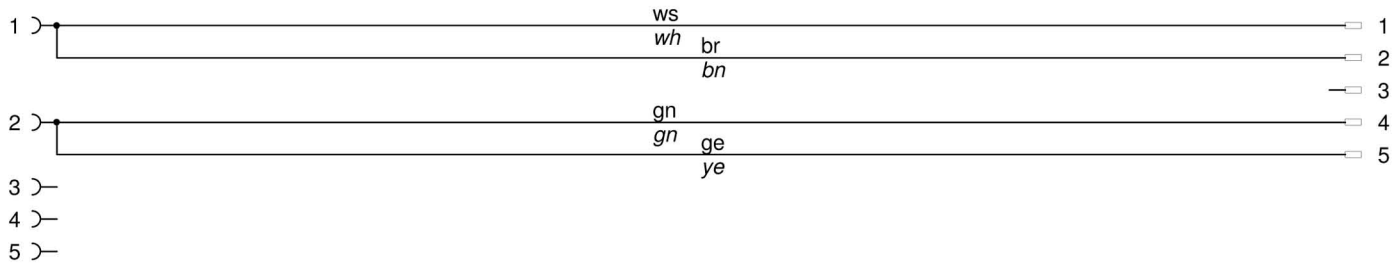
Machine: **MA6/BA6**
Title: **Bgr. Mikroskopbeleuchtung assy. microscope illumination**
Drawing number: **103400** Rev: **04**
Assy. number: **114162** Rev: **04**
Size: A2 | Date: 04/1995 | Sheet 1 of 1
Drawn by: J. Wanning | File: ba6\03012603\rev04.sch
Karl Suss

Kupplungsdose 5pol.
female connector 5 pins
(148809)

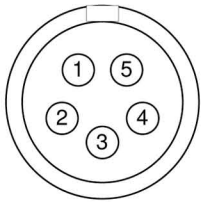
Kabel / cable LiYY 4 x 0.5
(146089)

Kupplungsstecker 5pol.
male connector 5 pins
(147939)



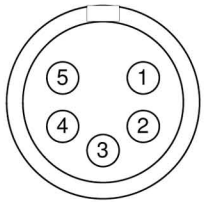


Kupplungsdose 5pol. - Ansicht Lötseite
female connector 5 pins - view solder side



Achtung :
Lötanschlüsse der Pins mit beiliegender Isolierhülse gegen das Metallgehäuse des Steckers isolieren !
Ggf. fehlende Isolierhülse durch ein Stück Schrumpfschlauch ersetzen !

Kupplungsstecker 5pol. m. - Ansicht Lötseite
male connector 5 pins - view solder side



Rev.	Änderung	Datum	Name

Machine: MA6/BA6
Title: Verb. Mikr.-Bel. <-> Lampenhaus
connection micr. illum. <-> lamp house
Drawing number: 102451
Rev: 01
Assy. number: 113369
Rev: 00
Size: A4
Date: 21.11.1995
Sheet 1 of 1
Drawn by: J. Wanning
File: 102451R01.sch

KARL SUSS

Frontplatte

front panel

" Microscope Illumination "
" Illumination Left "
" Illumination Right "

PT2.5...PT2.7 :
Potentiometer 100k (149878)

LiY0.25 :
- ws / wh : 146413
- gr / gy : 146708
- rs / pk : 147284

3 x LiY 0.25

" BSA / IR Illumination "
Drehschalter (159914)

Drehschalter (159912)
" Vergrößerungsumschaltung "

" Lower Substrate - Right "
" Upper Substrate - Right "
" Lower Substrate - Left "
" Upper Substrate - Left "

PT2.1...PT2.4 :
Potentiometer 10k (149742)

Stiftleiste D-SUB 25pol.
male D-SUB conn. 25 pins
(146250)
Haube
housing
(146280)

" Splitfield "
(150248)

(160965)

Leuchtwahltaste
illuminated switch
(149987)

Öffner / opener
(149989)
Schließer / shutter
(149988)

Anzeigeeinheit / display unit (114049)

Anzeige
display
(149759)

16adr. Flachbandkabel
flat cable 16 lines
(Länge / length 250mm)
(147413)

2 x Stecker 16pol. weibl.
2 x fem. conn. 16 pins
(148115)
2 x Stecker 16pol. männl.
2 x male conn. 16 pins
(147399)

Schnittstelle
interface
(149785)

Miniaturstecker 3pol.
male min. conn. 3 pins
(149298)

LiYY 25 x 0.25
Länge / length :
900mm
(162241)

Miniaturstecker 3pol.
male min. conn. 3 pins
Geh. / housing : 149198
3 x Kontakt / contact : 149201

-X3

br/bl
bn/bu
br/rs
bn/pk
br/rt
bn/rd

Brücke 0.25
bridge 0.25

BS
LS

Platine Schnittstelle
PCB interface
(149758)

ON
ON

Rev.	Änderung	Datum	Name
07	Anschluß Drehschalter PIN4	05.12.01	J.Lauer
06	-X3	24.06.1998	Ges
05	diverse	19.06.1998	R. Küstle
04	diverse	03.06.1998	R. Küstle
03	diverse	12.12.1997	R. Küstle
02	PT2.X	27.08.1997	R. Küstle
01	diverse	10.09.1996	R. Küstle
	erstellt: 13.07.1995		

Machine: MA6/BA6
Title: Frontplatte
front panel
DrawingNo.: 103505
Rev.: 07
AssemblyNo.: 114156
Rev.: 06
Drawn by: M.Braun
Size : A3_l
Date : 30-Jul-2003
File : 103505R07(A3).sch
Sheet 1 of 1

SUSS MicroTec

Platine Tastenfeld
PCB keyboard
(137776)

Stiftleiste 20pol.
male flat connector 20 pins

-X901: 1 GND
-X901: 2 +5V
-X901: 3 DAT
-X901: 4 CLK
-X901: 5 D0
-X901: 6 D1
-X901: 7 D2
-X901: 8 D3
-X901: 9 D4
-X901:10 INT
-X901:11 nc
-X901:12 nc
-X901:13 nc
-X901:14 BZ1
-X901:15 nc
-X901:16 nc
-X901:17 back
-X901:18 front
-X901:19 right
-X901:20 left

10pol. IST
(149388)

-X14:2 Grab/Image
-X14:1 Grab/Image

T22 (Garb Image - Extern)

P87C51
(149768 (unprogrammiert))

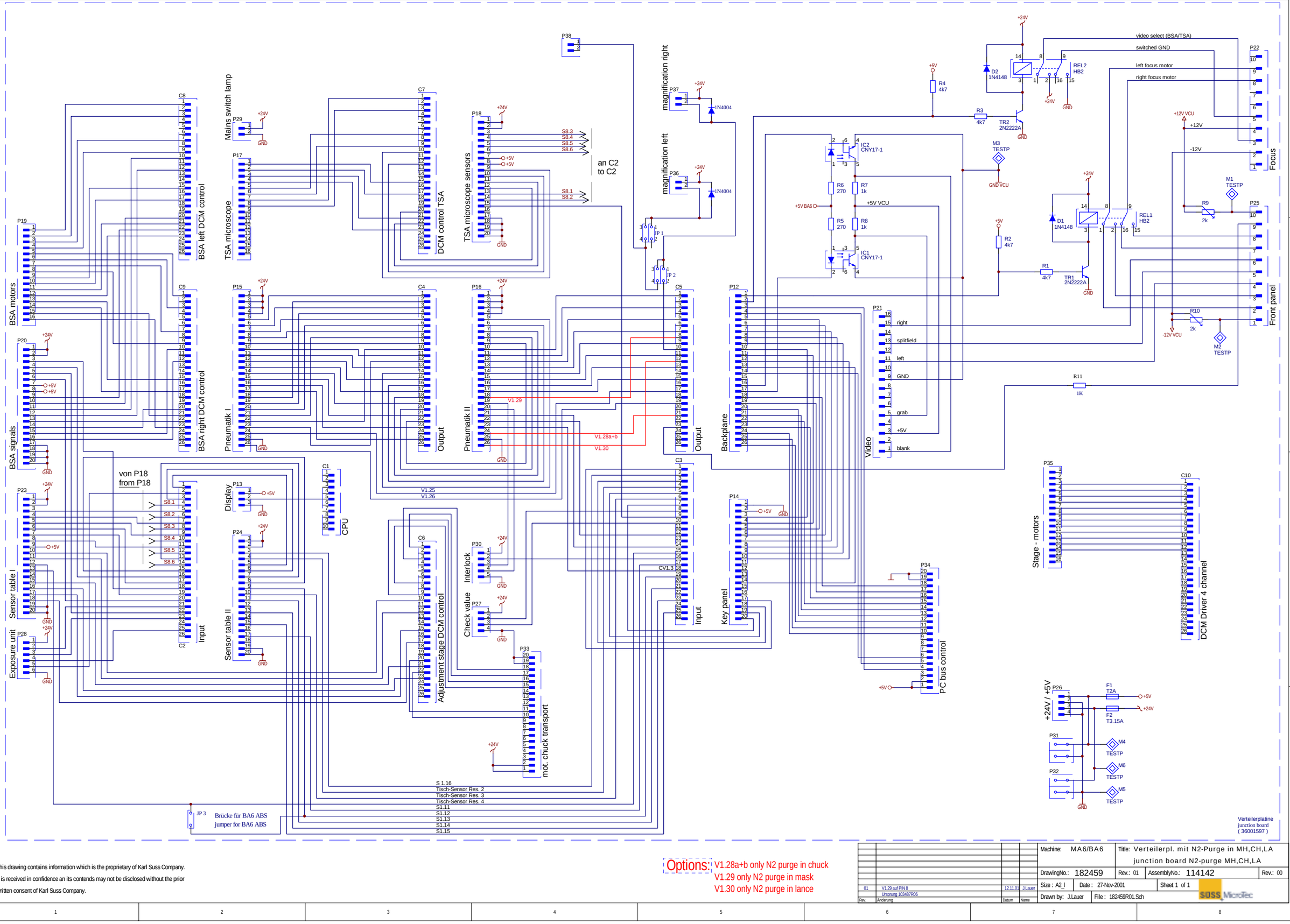
MM5450
(149723)

* optional - standardmäßig nicht bestückt
optional - not available on basic version

T0 / V0	separation ↑	T18 / V18	edit program
T1 / V1	separation ↓	T19 / V19	edit parameter
T2 / V2	fast	T20 / V20	pre bond
T3 / V3	load	T21 / V21	align cont./exp.
T4 / V4	unload	T22 / V22	grab image
T5 / V5	BSA microscope	T23 / V23	exposure
T6 / V6	left	T24 / V24	F1
T7 / V7	both	T25 / V25	change mask
T8 / V8	right	T26 / V26	lamp test
T9 / V9	top / bottom	T27 / V27	not available (option)
T10 / V10	option	T28 / V28	not available (option)
T11 / V11	multiple exposure	T29 / V29	not available (option)
T12 / V12	scan	T30 / V30	not available (option)
T13 / V13	set reference	T31 / V31	not available (option)
T14 / V14	enter	S1	↑ y
T15 / V15	perform clamping	S2	↓ y
T16 / V16	alignment check	S3	→ x
T17 / V17	select program	S4	← x

Rev.	Änderung	Datum	Name
02	Tabelle	16.03.2000	Igeis
01	Tabelle	02/98	R. Küster

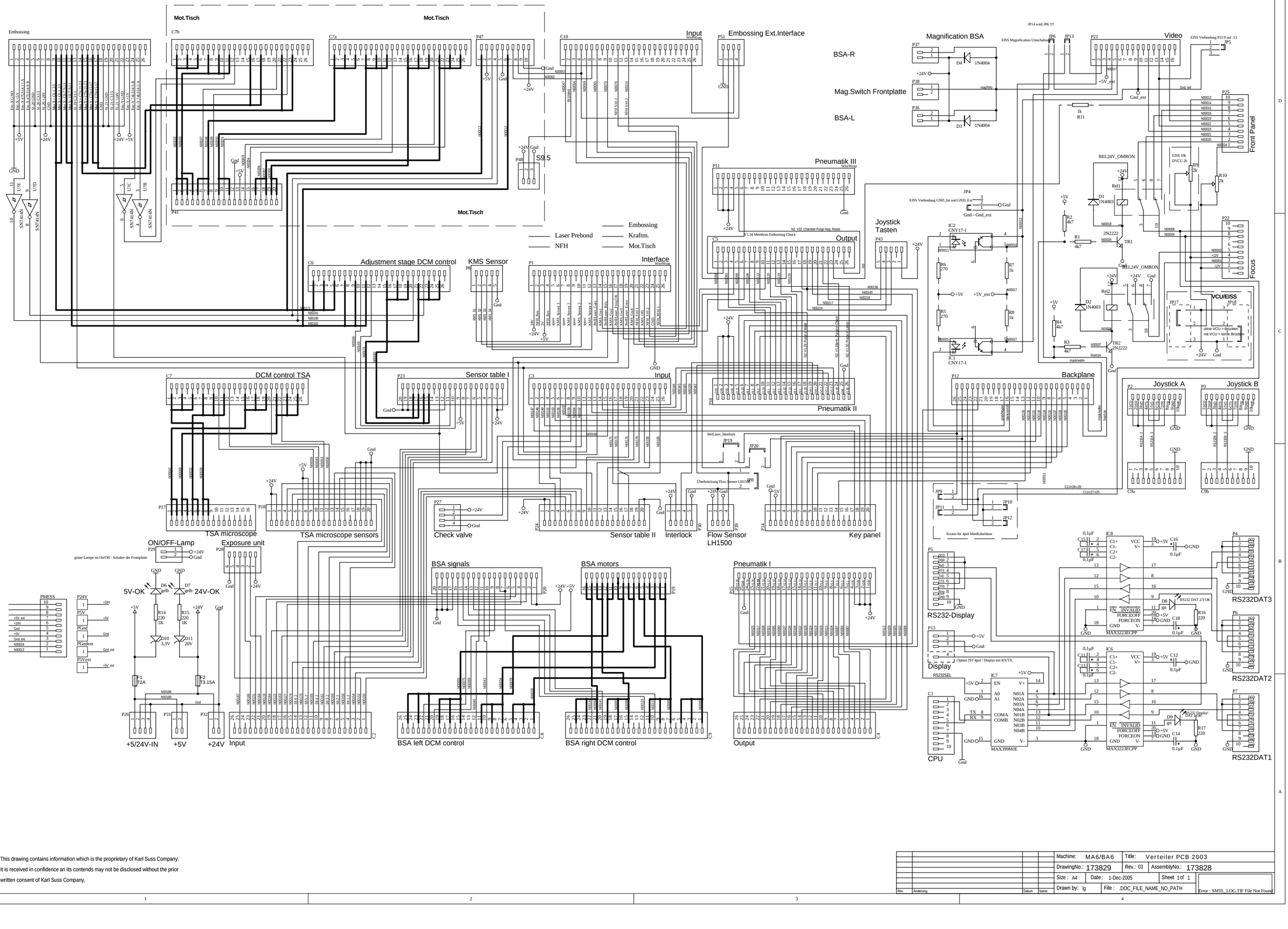
Machine: **MA6/BA6**
Title: **Tastenfeld keyboard**
Drawing number: **103490** Rev: **02**
Assy. number: **114145** Rev: **02**
Size: A3 Date: 12.09.1995 Sheet 1 of 1
Drawn by: J. Wanning File: 103490R02.sch
Karl Suss

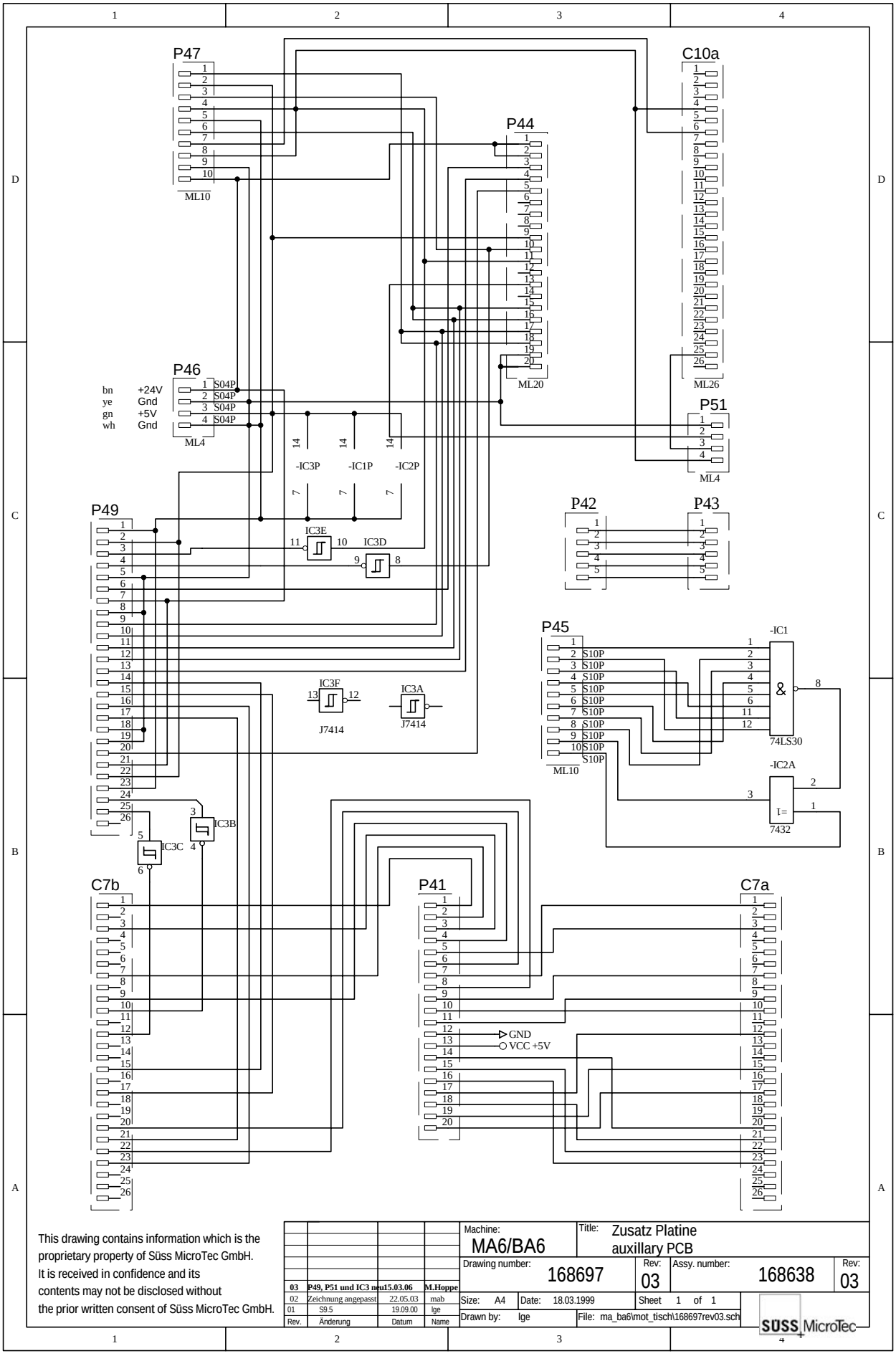


Options:
V1.28a+b only N2 purge in chuck
V1.29 only N2 purge in mask
V1.30 only N2 purge in lance

Machine: MA6/BA6			Title: Verteilerpl. mit N2-Purge in MH,CH,LA junction board N2-purge MH,CH,LA		
DrawingNo.: 182459	Rev.: 01	AssemblyNo.: 114142		Rev.: 00	
Size : A2_l	Date : 27-Nov-2001	Sheet 1 of 1			
Drawn by: J.Lauer	File : 182459R01.Sch				

Rev.	Änderung	Datum	Name
01	V1.29 auf PIN 8 Ursprung 103487R06	12.11.01	J.Lauer





Rev.	Änderung	Datum	Name
03	P49, P51 und IC3 neu15.03.06		M.Hoppe
02	Zeichnung angepasst	22.05.03	mab
01	S9.5	19.09.00	lge

Machine: MA6/BA6

Title: Zusatz Platine auxillary PCB

Drawing number: 168697 Rev: 03

Assy. number: 168638 Rev: 03

Size: A4 Date: 18.03.1999 Sheet 1 of 1

Drawn by: lge File: ma_ba6\mot_tisch\168697rev03.sch

SUSS MicroTec

P15
GND

C1 100n
IC1:2 VCC GND

Lichtintegrator
VCU
Overcurrent
Jumper
Keyboard

JC1 JC2 JC3 JC4 JC5 JC6 JC7 JC8 JC9 JC10 JC11

TOP
CS
CLK
D5
BLANK
TRIG/GRAB
TSA/BSA
VCU
DATA
D0 D1 D2 D3 D4 D5 D6 D7
8255-Datenbus
Keyboard
BDS7 BDS6 BDS5 BDS4 BDS3 BDS2 BDS1 BDS0
BDS
A0 A1 WR RD ALE RST
8255-Steuerbus
Lichtintegrator
BDS8 BDS9 BDS10 BDS11 BDS12

S6.4 S6.2 S6.3 S6.1 S8.5 S1.9 S8.3
NC1 NC9 NC8 NC7 NC6 NC3 NC2 NC5 NC4
NC12 NC10 NC11
TSA-Y TSA-X
BSA-L X BSA-L Y BSA-L-Y BSA-L-X
BSA-R X BSA-R Y BSA-R-Y BSA-R-X
Overcurrent
Jumper

P12
P13
P12/P13 1:1
P13/P13 1:1
DATA CLK INT.
VCU
Keyboard
Overcurrent
IC1:1 &
TSA-X TSA-Y BSA-L-X BSA-L-Y BSA-R-X BSA-R-Y NC12

P14
GND

Jumper-Tabelle
jumper table

	1+2	3+4	5+6	7+8
A	nc	X	X	nc
B	nc	nc	nc	nc
C	nc	X	nc	X
D	nc	X	nc	X
E	nc	X	X	nc
F	X	nc	nc	X
G	nc	X	X	nc
H	X	nc	nc	X

Busplatine
PCB backplane
(137774)

Machine: MA6/BA6	Title: Busplatine backplane	
Drawing number: 103488	Rev: 01	Assy. number: 114143 Rev: 01
Size: A1 Date: 14.11.1995	Sheet 1 of 1	
Drawn by: J.Wanning	File: 103488f01.sch	

JC1

JC2

JC3

JC4

JC5

JC6

JC7

JC8

JC9

JC10

JC11

P12

P13

P45

IC1A

P15

P14

C18
C1 100n
VCC
GND

VCU
Overcurrent
Jumper
Keyboard
Lichtintegrator

8255-Datenbus

8255-Steuerbus

BDS

Jumper-Tabelle
jumper table

	1+2	3+4	5+6	7+8
A	nc	X	X	nc
B				
C				
D				
E	nc	X	X	nc
F	X	nc	nc	X
G				
H				

Busplatine
PCB backplane
(300016300)

Verteilerplatte
168685

P1

+5V

Gnd

2x0,14

Gnd - RS232 Display

Machine: MA6/BA6		Title: Busplatine backplane	
Drawing number:	168688	Rev: 00	Assy. number: 168687 Rev: 00
Size: A1	Date: 7.7.99	Sheet 1 of 2	
Drawn by: fge		File: ba6ba6250302rev00.sch	

Rev. | Änderung | Datum | Name

Zusatzverbindungen Busplatine
Additional connections bus-PCB

Busplatine		Jumperblock	
C6 / a10	-	C / 3	Jumper entfernen
C6 / a11	-	C / 7	*remove jumper*
C6 / a12	-	D / 3	(Enschalter TSA umgelegt
C6 / a13	-	D / 7	von C7 auf C6 ext.)
C8 / a10	-	G / 3	Jumper entfernen
C8 / a11	-	G / 5	*remove jumper*
C8 / a12	-	H / 1	(Enschalter BSA umgelegt
C8 / a13	-	H / 7	von C9 auf C8 ext.)

C9 / a12 - C1 / a12

Busplatine		Busplatine	
C6 / c14	-	C6 / a14	(Reste Overcurrent ext.)
C6 / c15	-	C6 / a15	
C7 / c14	-	C7 / a14	(Reste Overcurrent ext.)
C7 / c15	-	C7 / a15	
C8 / c14	-	C8 / a14	(Reste Overcurrent ext.)
C8 / c15	-	C8 / a15	

Busplatine		Busplatine	
C7 / c12	-	C3 / b10	
C7 / c13	-	C3 / b 9	(Endschalter mot. Tisch von C7 auf die
C7 / c10	-	C2 / a11	Eingangskarten C2 und C3 umgelegt.
C7 / c11	-	C2 / a12	Durch das Öffnen der Jumper sind die
			Verbindungen getrennt !)
C7 / a12	-	C3 / b 5	
C7 / a13	-	C3 / b 7	

Busplatine		Busplatine	
C6 / c12	-	C10 / b5	TSA-R1
C6 / c13	-	C10 / b6	TSA-R2

(Endschalter TSA Verdrehung; kein Ref. Schalter)

Busplatine		Busplatine		Busplatine		Busplatine		Busplatine		Busplatine		Busplatine	
C3 / c23	-	C4 / c23	-	C5 / c23	-	C6 / c23	-	C7 / c23	-	C8 / c23	-	C9 / c23	(ALE weiterverbunden)
C5 / c19	-	C6 / c19	-	C7 / c19	-	C8 / c19	-	C9 / c19					(A1 weiterverbunden)

Busplatine		IST-Stecker P45	
C6 / c8	-	Pin 1	(rt)
C6 / c9	-	Pin 2	(sw)
C7 / c8	-	Pin 3	(bl)
C7 / c9	-	Pin 4	(rs)
C8 / c8	-	Pin 5	(gr) Überstrom
C8 / c9	-	Pin 6	(ge) *overcurrent*
C9 / c8	-	Pin 7	(gn)
C9 / c9	-	Pin 8	(bn)
C1 / b23	-	Pin 9	(ws)
IC1/ 8	-	Pin 10	(vi)

Embossing only :

C2/a11 - C7/c10
C2/a12 - C7/c11
C3/b9 - C7/c13
C3/b10 - C7/c12
C3/b5 - C7/a12
C3/b7 - C7/a13

} remove these connections

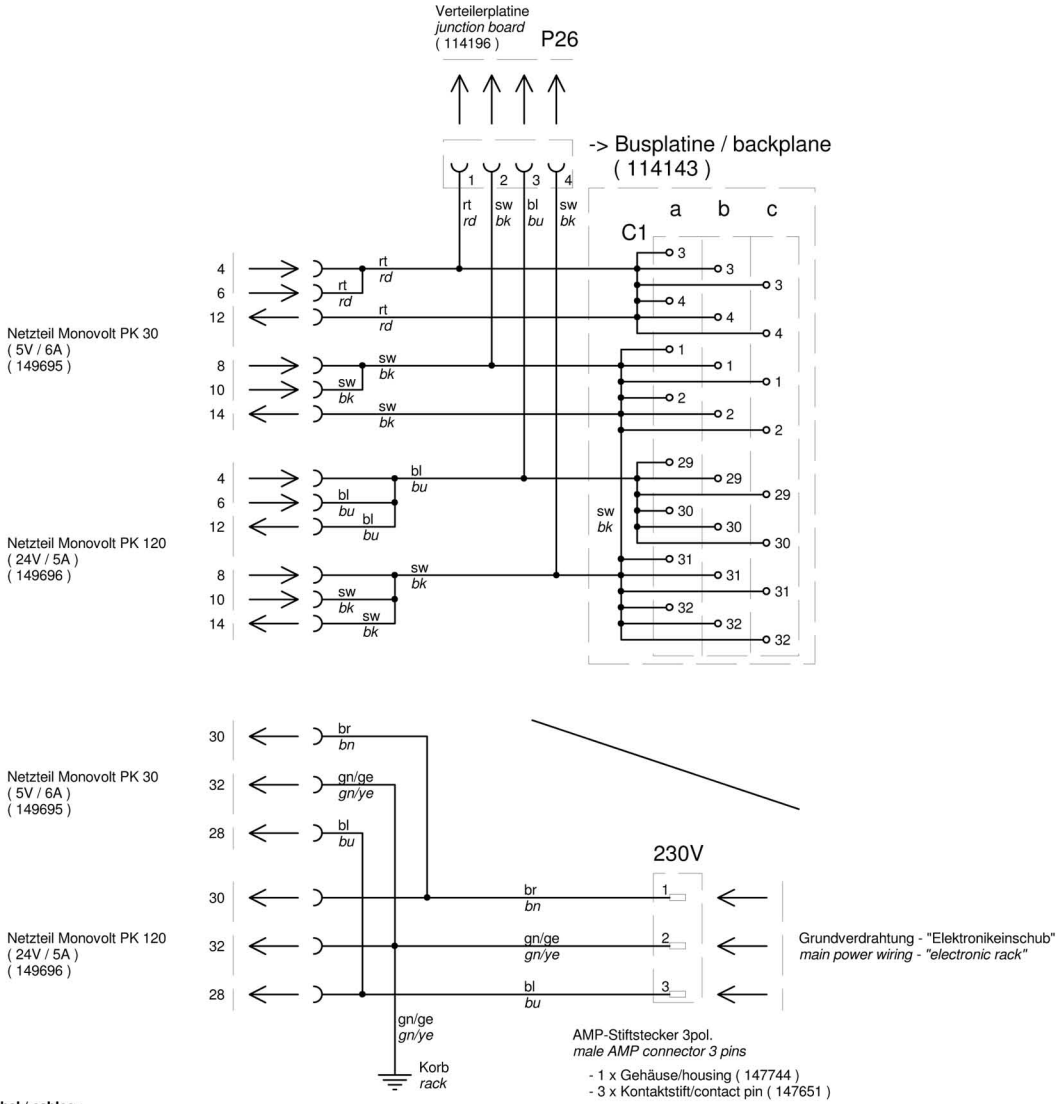
C7/a10 - GND
C7/a11 - GND
C6/c13 - GND
C6/c12 - GND

} add new connection

Rev.	Änderung	Datum	Name
01	Embossing	10.04.2006	M.Hoppe

Machine: MA6/BA6
Title: Busplatine backplane
Drawing number: 168688
Rev: 01
Assy. number: 168687
Rev: 01
Size: A4
Date: 7.7.99
Sheet 2 of 1
Drawn by: Ige
File: maba6\168688..\02rev01.sch

Karl Suss



Kabel / cables :

Brücken PK120 -> PK30 :

28 -> 28 (N) : LiY 1.0 bl / bu (150087)
30 -> 30 (L) : LiY 1.0 br / bn (140089)
32 -> 32 (PE) : LiY 1.5 gn/ge Erdung / gn/ye GND (146418)

PK120 -> Grundverdrahtung (LiY 1.0) :

N : LiY 1.0 bl / bu (150087)
L : LiY 1.0 br / bn (140089)
PE : LiY 1.5 gn/ge Erdung / gn/ye GND (146418)

Korberdung : LiY 1.5 gn/ge Erdung / gn/ye GND (146418)

Brücken PK30 :

6 -> 4 : LiY 1.0 rt / rd (150088)
8 -> 10 : LiY 1.0 sw / bk (150086)

Brücken PK120 :

6 -> 4 : LiY 1.0 bl / bu (150087)
6 -> 12 : LiY 0.25 bl / bu (146706)
8 -> 10 : LiY 1.0 sw / bk (150086)
8 -> 14 : LiY 0.25 sw / bk (146421)

PK30/PK120 -> P26 (LiY 1.0) :

+5V : rt / rd (150088)
+24V : bl / bu (150087)
GND PK30 : sw / bk (150086)
GND PK120 : sw / bk (150086)

PK30/PK120 -> C1 :

+5V : LiY 1.0 rt / rd (150088)
+24V : LiY 1.0 bl / bu (150087)
GND PK30 : LiY 1.0 sw / bk (150086)
GND PK120 : LiY 1.0 sw / bk (150086)
+5V sense PK30 : LiY 0.25 rt / rd (147285)
GND sense PK30 : LiY 0.25 sw / bk (146421)

Masseverbindung PK30 -> PK120 (an C1) :

LiY 1.0 sw / bk (150086)

Kabelschuhe / cable shoes :

PK30 :

alle Anschlüsse / all pins :
Flachstecker 6.3x0.8 rt
cable shoe 6.3x0.8 rt
(158794)

PK120 :

Anschlüsse/pins 4,8,12,14 :
Flachstecker 6.3x0.8 rt
cable shoe 6.3x0.8 rt
(158794)

Anschlüsse/pins 6,10,28,30,32 :
Flachstecker 6.3x0.8 bl
cable shoe 6.3x0.8 bl
(146935)

Rev.	Änderung	Datum	Name
02	Pinbelegung C1	14.01.1998	R. Küster
01	24V Mikroskopbel. entfällt	14.05.1996	R. Küster
	erstellt: 10.10.1995		

Machine: **MA6/BA6**
Title: **Elektronikeinschub**
electronic rack
DrawingNo.: 103500 | Rev.: 02 | AssemblyNo.: 108277 | Rev.: 01
Size : A4_p | Date : 30-Jul-2003 | Sheet 1 of 1
Drawn by: M.Braun | File : 103500R02.SCH
SUSS MicroTec

Flachstecker 26pol. *flat conn. 26 pins*	D-Sub-Stecker 25pol. *D-sub conn. 25 pins*
1	1
2	14
3	2
4	15
5	3
6	16
7	4
8	17
9	5
10	18
11	6
12	19
13	7
14	20
15	8
16	21
17	9
18	22
19	10
20	23
21	11
22	24
23	12
24	25
25	13
26	

Verteilerplatine C2...C9
junction board C2...C9

Elektronikkarten C2...C9
boards C2 .. C9

Rufla - Kabel
round cable with flat / D-SUB connectors

Rev.	Änderung	Datum	Name

Machine: **MA6/BA6**		Title: **Adapterkabel Verteilerplatine-Karten extension cable junction board - cards**	
Drawing number: **182253**	Rev: **00**	Assy. number: **149754**	Rev: **00**
Size: A4	Date: 31.01.1996	Sheet 1 of 1	
Drawn by: J. Wanning	File: 182253R00.sch		

Karl Suss

CONFIGURATION CHART

ASSY#	JF1	JF2	JF3	JF4	JF5	R14	R16	R12	Y1	U13	U14
-01		1-2	1-2	2-3					8MHZ	CNY17	
-02		1-2	1-2	1-2	1-2				12MHZ		74LS645
-03		1-2	1-2	2-3					8MHZ	CNY17	74LS645
-04		1-2	1-2	2-3				4.7K	8MHZ	CNY17	74LS645
-05		1-2	1-2	1-2	1-2				12MHZ		74LS645
-06		1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645
-07	1-2	1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645
-08		1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645
-09	1-2	1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645
NO DASH		1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645
-11	1-2	1-2	1-2	1-2	1-2			4.7K	12MHZ		74LS645

Jumper 1 to 2 for banking, 2 to 3 for normal operation

JUMPER 1 TO 2 FOR MA150 TYPE COMUNICATIONS OR 2 TO 3 FOR XRS

Machine: MA/BA6	Title: 8-Bit µ-Controller MA/BA6				
DrawingNo.: 174851	Rev.: 00	AssemblyNo.: 174850			
Size : A4	Date : 22-Dec-2004	Sheet 1 of 1			
00 based on Rev.01 103543	10:06:00 Typ	Drawn by: LGeis	File : .DOC_FILE_NAME_no_path		
Rev. Änderung	Datum Name				

Abblockkondensatoren
power stabilizing capacitors

IC1...IC3 : ULN2803 (61039845)
U1 : 8255A (61038377)

D1...D24 :8 x 3fach-LED 3mm rot
8 x triple LED 3mm red
(61040533)

C1 22u/40V
C2 47u/35V
C3 100n
C4 10n
C5 100n
C6 100n
R1 15k
R2 4k7
T1 2N2222
RN1...RN8 4x4k7

C4	C5
V1.1	V1.24
V1.2	V8.1
V1.3	V8.2
V1.4	V8.3
V1.5	V1.22
V1.6	V1.13
V1.7	V9.4
V1.8	V9.5
V1.9	V1.25
V1.10	V1.26
V1.11	
V1.12	
V1.14	
V1.15	
V1.16	
V1.17	
V1.18	
V1.19	
V1.20	
V1.21	
V1.23	
V9.1	
V9.2	
V9.3	

LED positions :

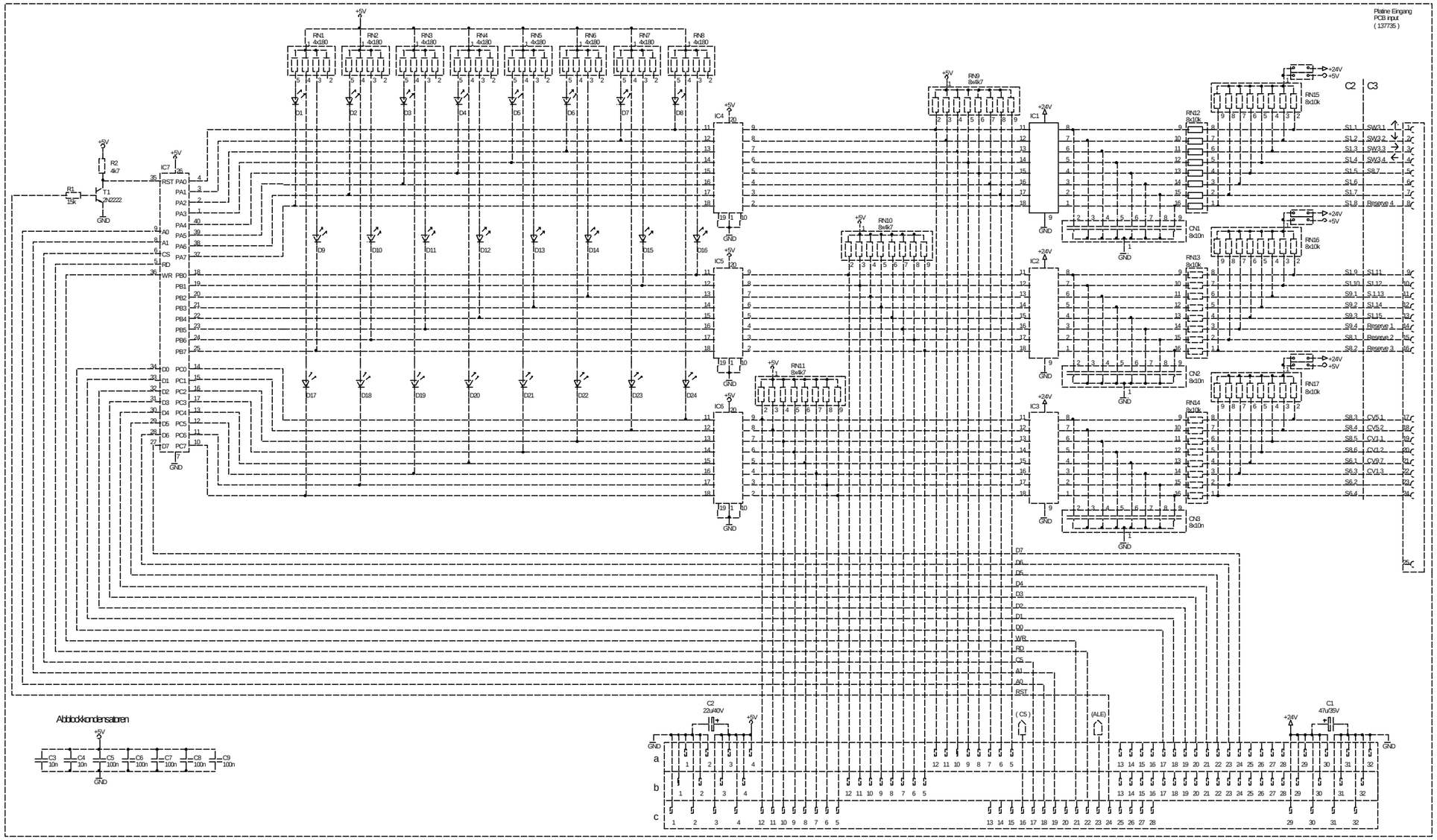
D17 D9 D1
D24 D16 D8

Platine Ausgang
PCB output
(36001228)

Rev.	Änderung	Datum	Name
02	VG Leiste +5V / +24V getauscht, Lötpads Pullup im Plan eingefügt	18.06.03	lg
01	Beschriftung V1.25/26 eingefügt	27.10.95	mh

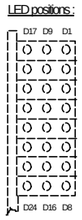
Machine: MA6/BA6
Title: PCB Ausgangskarte
DrawingNo.: 103207
Rev.: 02
AssemblyNo.: 113775
Rev.: 00
Size : A3
Date : 30-Mar-2006
Sheet 1 of 1
Drawn by: J.Wan.
File : .DOC_FILE_NAME_NO_PATH
Error : SMTL_LOG.TIF File Not Found

Platine Eingang
PCB input
(137735)



Abblockkondensatoren

LED-Anordnung :
LED positions :



IC1...IC3 : ULN2803 (149642)
IC4...IC6 : 74LS540 (149227)
IC7 : 8255A (149508)
D1...D24 : LED 3mm grün (149643)

Anmerkung : Statt der Jumper werden Lötbrücken eingesetzt !

Rev	Änderung	Datum	Name
03	+ C8,9	20.11.00	Ige
02	CV9.1 -> CV9.7	06.06.1996	R. Kloss
01	CV1.3	15.09.1995	R. Kloss

Machine: **MA6/BA6**
Title: **Eingangskarte input card**
Drawing number: **103225** Rev: **03**
Assy. number: **113764** Rev: **00**
Size: A2 Date: 15.09.1995 Sheet 1 of 1
Drawn by: J. Wanning File: 103225R03.sch

Platine DC-Motorsteuerung
PCB DC motor control
137744

X1
flach
64pol.
c a

X2
D-SUB
25pol.

IC1, IC2 : L298 (149510)
IC3, IC4 : 74LS10 (146734)
IC5, IC6 : LM629-8 (149743)
IC7 : LM393 (146766)
IC8 : 74LS74 (146738)
IC9 : 74HCT04 (149110)
DR1, DR2 : LED mit R (149368)

				Machine: **Maschine**	Title: **PCB Motorsteuerkarte 2CH.**		
				DrawingNo.: 103236	Rev.: 02	AssemblyNo.: 113824	
				Size : A2_p	Date : 30-Jul-2003	Sheet 1 of 1	SUSS MicroTec
Rev.	Änderung	Datum	Name	Drawn by: M.Braun	File : 103236R02(A2).SCH		

CH_1

Adresse	Achse
C500	BSA1-Y
C501	TSA1-Y
C500	Z-Achse

CH_3

Adresse	Achse
C502	BSA3-Y
C501	TSA-Y
C502	

CH_2

Adresse	Achse
C600	BSA2-X
C600	TSA1-X
C400	TSA-ext

CH_4

Adresse	Achse
C802	BSA3-X
C602	TSA-ext
C402	TSA-X

D-SUB 25 pins

flat 64 pins

TP_.. Testpunkte an der Frontseite der Platine

- additional adress decoding

This drawing contains information which is the proprietary property of Karl Suss. It is received in confidence and its contents may not be disclosed without the prior written consent of Karl Suss.

				Machine: MA6/BA6	Title: Motorsteuerkarte PCB 4 Chanel DC motor control
05	S1mOhm !!	24.07.01	Ige	Drawing number: 16 75 93	Rev.: 05
04	Achsen-Tabelle	14.08.00	Ige		Assy. number: 16 62 25 Rev.: 05
03	Kondensatoren 100n	19.5.99	Ige		
02	Verschiedenes	1.03.99	Ige	Size: A2 Date: 26.11.1998	Sheet 1 of 1
01	Verschiedenes	10.12.98	Ige	Drawn by: Ige	File: ba6\166225rev05.sch
Rev.	Änderung	Datum	Name		Karl Suss

Stecker / connectbrs :

- für / for S1.1, S1.2, S1.7...S1.15 :

  6 x Miniaturstecker 3pol. weibl., bestehend aus :
  6 x fem. miniature connector 3 pins, consisting of :
  - 1 x Gehäuse / housing (149198)
  - 3 x Kontaktbuchse / contact shoe (149201)

- für / for DCM1.1A :

  1 x Miniaturstecker 2pol. weibl., bestehend aus :
  1 x fem. miniature connector 2 pins, consisting of :
  - 1 x Gehäuse / housing (149197)
  - 2 x Kontaktbuchse / contact shoe (149201)

- für / for S1.5, S1.6 :

  1 x Miniaturstecker 4pol. weibl., bestehend aus
  1 x fem. miniature connector 4 pins, consisting of :
  - 1 x Gehäuse / housing (149199)
  - 4 x Kontaktbuchse / contact shoe (149201)

  1 x Flanschstecker 4pol. männl.
  1 x male flange connector 4 pins
  (149897)

  1 x Flanschstecker 4pol. weibl.
  1 x female flange connector 4 pins
  (149900)
  (-> 111674)

- für / for S1.3, S1.4 :

  2 x Einbaustecker 3pol. männl.
  2 x male insert connector, 3 pins
  (149650)

Sensoren / sensors :

- S1.1...S1.6, S1.9, S1.12...S1.15 :

  induktiver Sensor 8x40
  sensor, inductive 8x40
  (146062)

- S1.7, S1.8 :

  induktiver Sensor Dia 3x25
  sensor, inductive dia 3x25
  (149762)

- S1.10 :

  induktiver Sensor Dia 7x45
  sensor, inductive dia 7x45
  (146113)

- S1.11

  induktiver Sensor 8x20
  sensor, inductive 8x20
  (149807)

only in use for motorized stage

x-Achse Mittelstellung - *x axis chuck center -* S1.1
x-Achse Mittelstellung + *x axis chuck center +* S1.2
Adaption bonder *bonder fixture* S1.7
Adaption mask aligner *mask aligner fixture* S1.8
Endlagen th-Achse *end limit pos. th axis* S1.16 Reserve1
Mittelstellung th-Achse *chuck center th axis* S1.17 Reserve2
Endlagen th-Achse *end limit pos. th axis* S1.18 Reserve3
Endlagen x-Achse ± 3mm *end limit pos. x axis* S1.12
Mittelstellung - y-Achse *chuck center - y axis* S1.13
Mittelstellung + y-Achse *chuck center + y axis* S1.14
Endlagen y-Achse ± 3mm *end limit pos. y axis* S1.15

Schieber vorn *slide front* S1.3
Schieber hinten *slide rear* S1.4
Tisch Drehung *table rotation* S1.11
Z-Achse abwärts *z-axis down* S1.9
Keilfehler-ausgleich *wedge error compensation* S1.10

Drehgeber *encoder* — Motor z-Achse *motor z-axis* — Motor *motor*

DCM1.1:2 (+ A B -)
DCM1.1 : Motor und Drehgeber *motor and encoder* (151796)
DCM1.1:1 (+ -)
DCM1.1:3 (rt *rd*, sw *bk*)

-> Adapterrahmen Maskenhalter *mask holder adaption frame* (111674)
Maskenhalter Standard *mask holder standard* S1.5
Maskenhalter Proximity *mask holder proximity* S1.6

2 x konf. Kabel *2 x ready-made cable* (149651)

Kabel / cable : LiYY 4 x 0.14 (noch keine Nr. !!!) (ws *wh*, br *bn*, gn *gn*, ge *ye*)

Die Platine Tisch-Sens. wurde nach dem Plan Rev02 neu layoutet. Der Schaltplan hatgegenüber der alten Platine folgenden Fehler :
Die Verbindungen der Sensoren S1.3 und S1.4 sind vertauscht dargestellt !
Die neue Platine ist nach Schaltplan layoutet. Deshalb wurden die Anschlußkabel der Sensoren S1.3 und S1.4 getauscht.

113906
Platine Tisch-Sens. PCB sensor table (137755)
U1:2 U1:3 U1:4 U1:5 U1:6 U1:7 U1:1 100n C1

114247
Platine Justiertisch *PCB alignment stage* (137803)

Flachbandkabel Justiertisch *alignment stage flat cable* (114253)
(Länge / length 400mm)

+24V GND DCM + DCM - DCM - DCM +

Ruflakabel 20 adr. (Länge 1300mm) *round cable with flat conn. 20 leads (length 1300mm)* (149747)
ws/*wh* br/*bn* gn/*gn* ge/*ye* gr/*gy* rs/*pk* bl/*bu* rt/*rd* sw/*bk* vi/*vt* gr/rs *gy/pk* rt/bl *rd/bu* ws/gn *wh/gn* br/gn *bn/gn* ws/ge *wh/ye* ge/br *ye/bn* ws/gr *wh/gy* gr/br *gy/bn* ws/rs *wh/pk* rs/br *pk/bn*

Verteilerplatine / junction board (114142) - X24

Verteilerplatine / junction board (114142) - X23

Rev.	Änderung	Datum	Name
04	1.16, 1.17, 1.18 inserted	15.01.02	lge
new	based on 103508_R03 from 28.09.1995	15.01.02	lge

Machine: **MA6/BA6** | Title: **Bgr. Justiertisch**
DrawingNo.: 103508 | Rev.: 04 | AssemblyNo.: 114197
Size : A2_l | Date : 30-Jul-2003 | Sheet 1 of 1
Drawn by: M.Braun | File : 103508R04(A2).SCH

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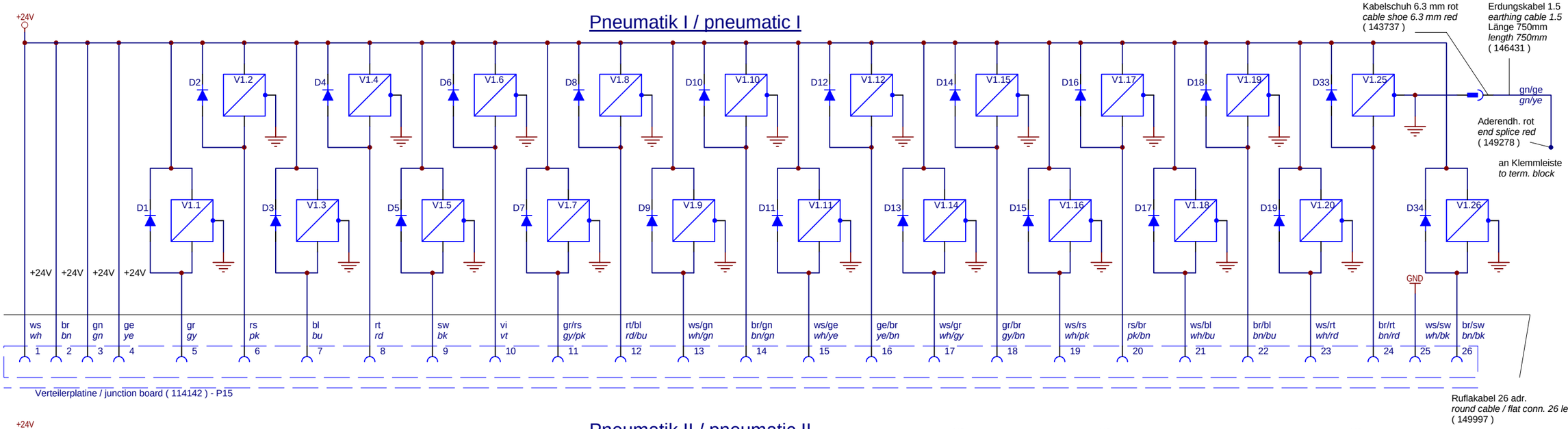
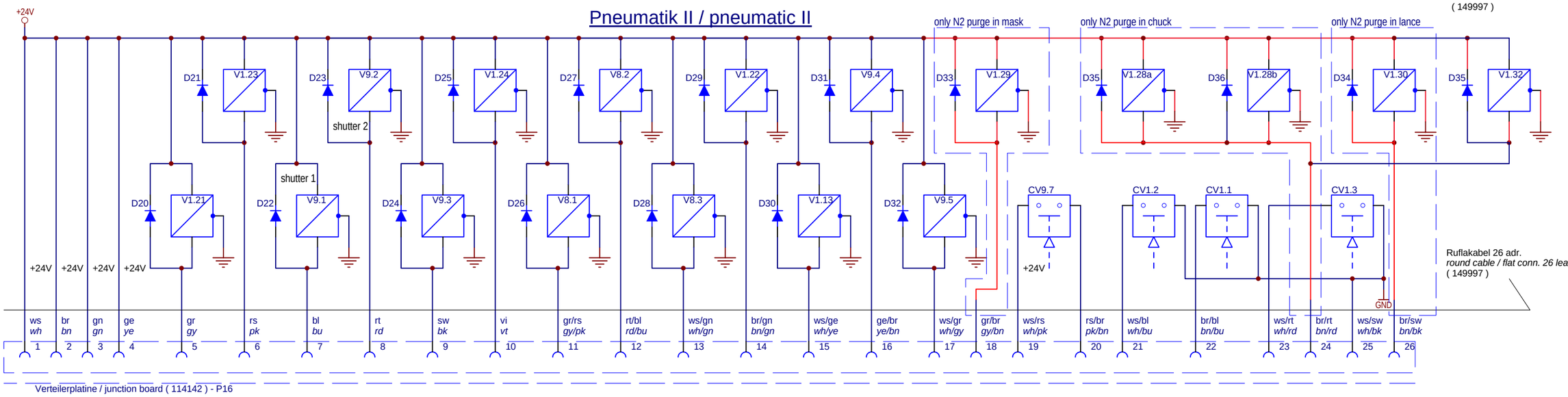
Pneumatik I / pneumatic I

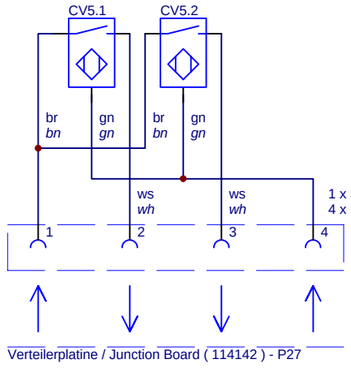


Pneumatik II / pneumatic II



auf Grundplatte montiert !

mounted on ground plane !



1 x Steckergehäuse / connector housing (149199)
4 x Kontaktbuchse / contact shoe (149200)

V... :
Micromagnetventil / electrovalve (150920)

CV 1.1..1.3, CV9.7 :
Niederdruckbereichsschalter / low pressure range switch (151203)

CV5.1, CV5.2 :
Pneumat.-elektron. Schalter / pneumatic-electronic switch (151089)

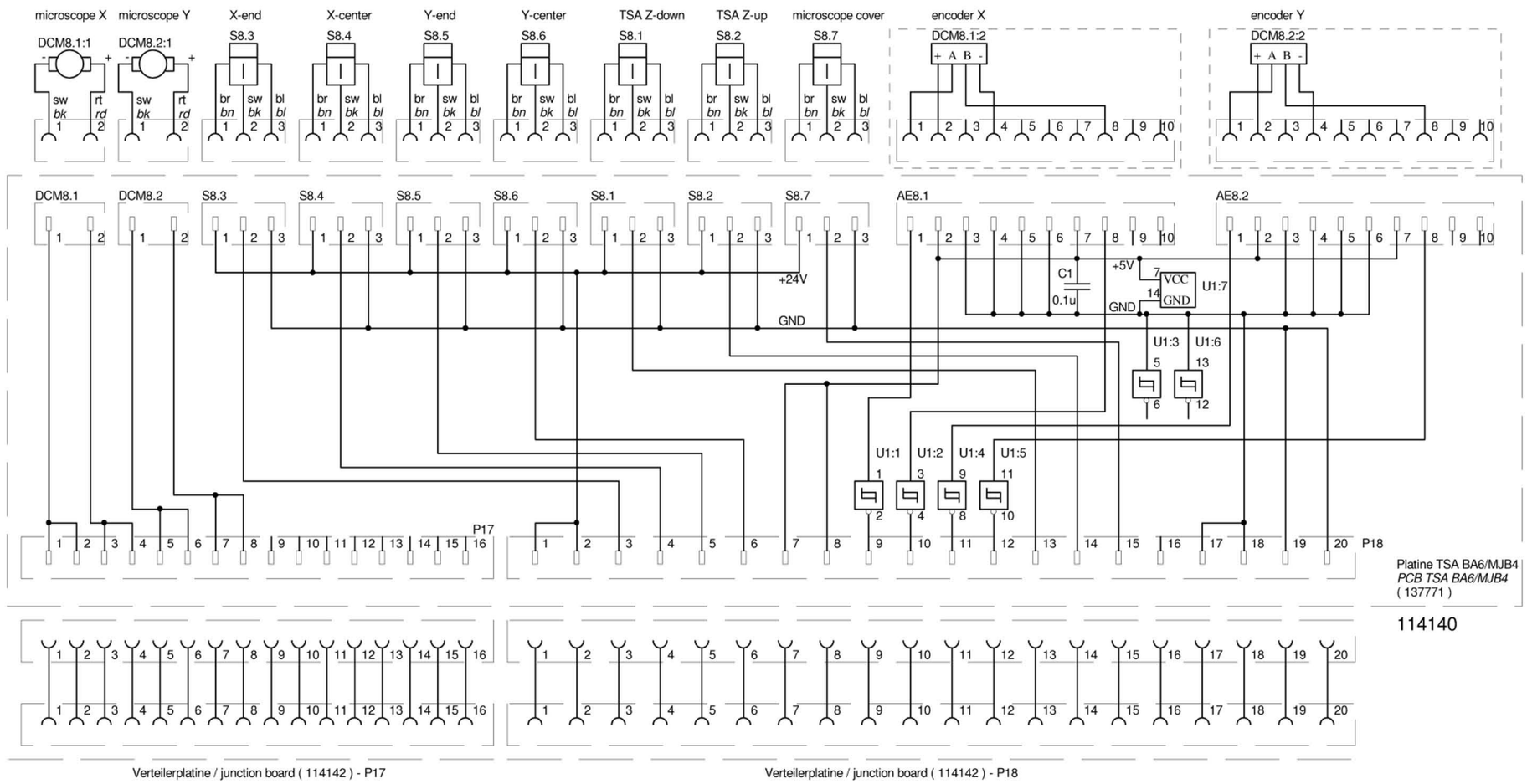
D1...D34 :
1N4003 (146076)

Pneumatik - Erde

Rev.	Änderung	Datum	Name
01	V 1.32 hinzu	08.05.06	M.Hoppe
	Ursprung 103504R02	22.10.2003	J.Lauer

Machine: MA6/BA6
Title: Pneumatik N2-Purge in MH,CH,LA
pneumatic N2-purge in MH,CH,LA
DrawingNo.: 182458 Rev.: 01 AssemblyNo.: 108347 Rev.: 01
Size : A3_l Date : 8-May-2006 Sheet 1 of 1
Drawn by: J. Lauer File : .DOC_FILE_NAME_no_path

SUSS MicroTec



Ruflakabel 16pol.
round cable / flat conn. 16pins
(149996)

Ruflakabel 20pol.
round cable / flat conn. 20pins
(149747)

Stecker für / connectors for DCM8.1A, DCM8.2A :

- 1 x Steckergehäuse / connector housing (149197)
- 2 x Kontaktbuchse / contact shoe (149201)

Stecker für / connectors for S8.1..S8.7 :

- 1 x Steckergehäuse / connector housing (149198)
- 3 x Kontaktbuchse / contact shoe (149201)

DCM8.1, DCM8.2 :

Motor und Drehgeber / motor and encoder (151796)

S8.1, S8.2 :

Näherungsinitiator, induktiv / sensor, inductive (146113)

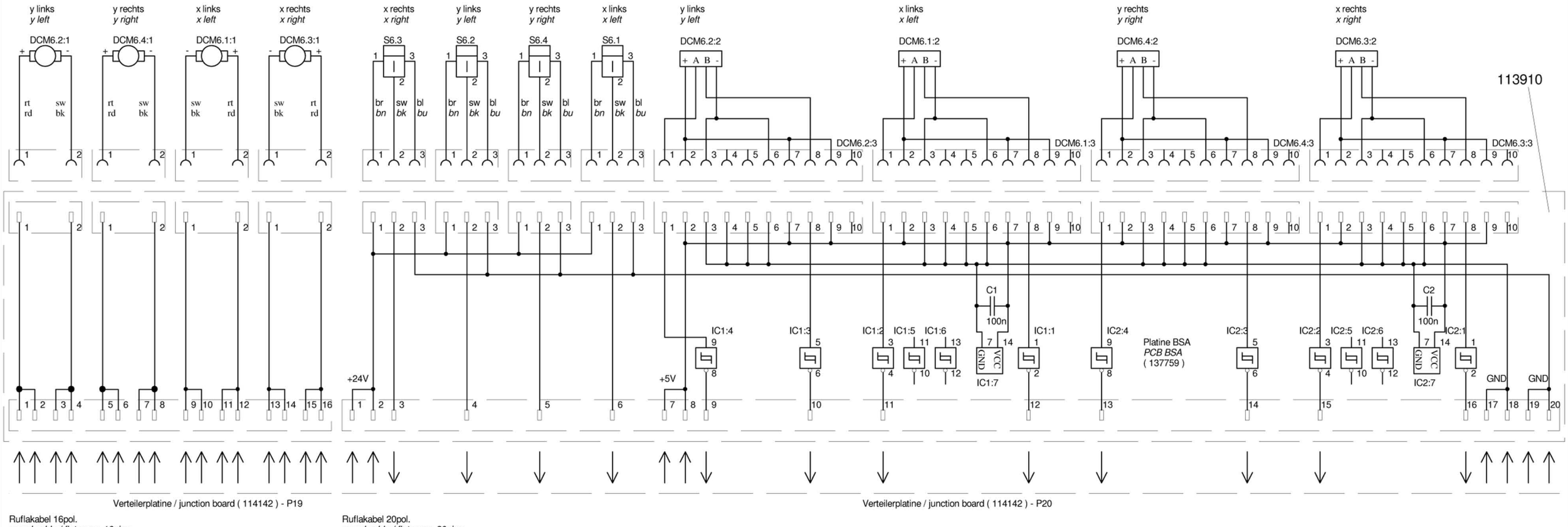
S8.3..S8.7 :

Näherungsinitiator, induktiv / sensor, inductive (149324)

U1 = 74LS14

Rev.	Änderung	Datum	Name

Machine: **MA6/BA6**		Title: **Bgr. TSA-Mikroskopmanipulator** **assy. tsa microscope manipulator**	
Drawing number: **103485**	Rev: **00**	Assy. number: **114171**	Rev: **00**
Size: A3	Date: 16.05.1995	Sheet 1 of 1	
Drawn by: J. Wanning	File: 103485R00.sch	KarlSuss	



Ruflakabel 16pol.
round cable / flat conn. 16pins
(149996)

Ruflakabel 20pol.
round cable / flat conn. 20pins
(149747)

DCM6.1...DCM6.4 :

Motor und Drehgeber
motor and encoder
(130056)

S6.1...S6.4 :

Näherungsinitiator, induktiv 8x40
sensor, inductive 8x40
(146062)

Stecker für DCM6.1...DCM6.4 :

Miniaturstecker 2pol. weibl., bestehend aus :
fem. miniature connectors 2 pins, consisting of :

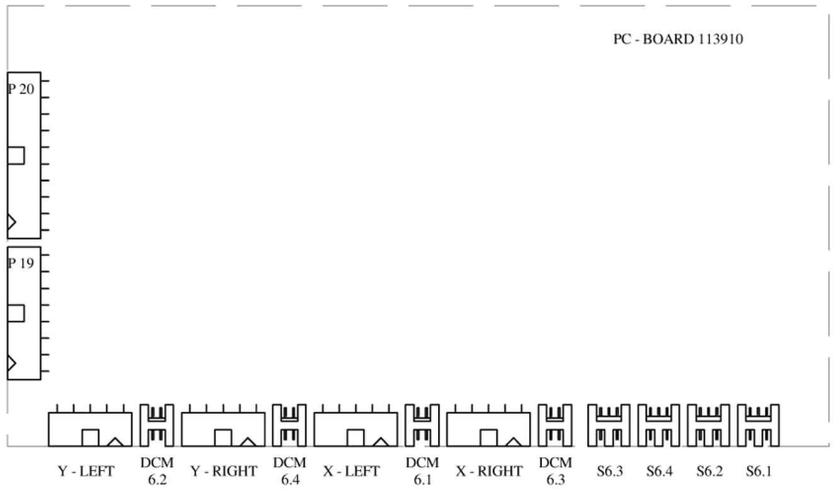
1 x Gehäuse/housing (149197)
2 x Kontaktbuchse / contact shoe (149201)

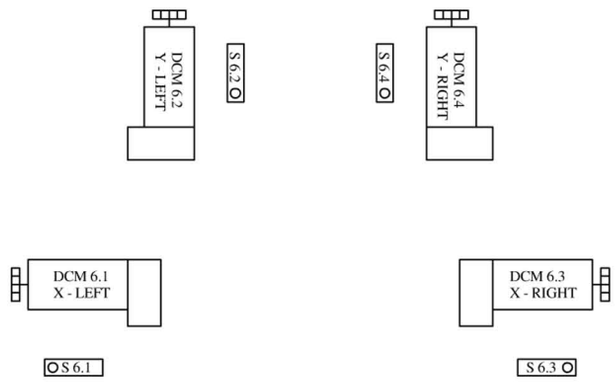
Stecker für S6.1...S6.4 :

Miniaturstecker 3pol. weibl., bestehend aus :
fem. miniature connectors 3 pins, consisting of :

1 x Gehäuse/housing (149198)
2 x Kontaktbuchse / contact shoe (149201)

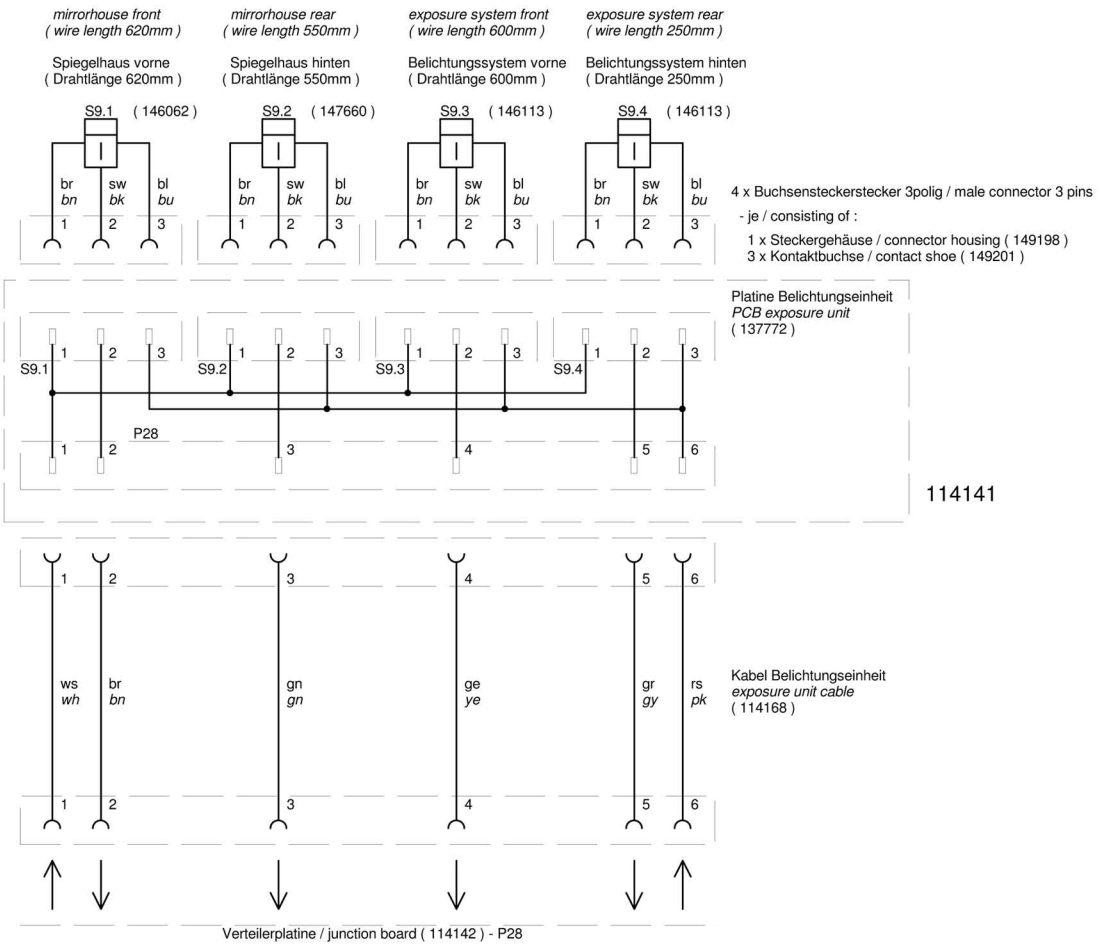
IC1 = 74LS14





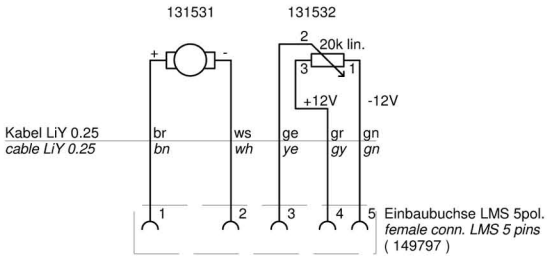
Rev.	Änderung	Datum	Name
01	PCB Anschlüße	06.10.1997	M.Hoppe

Machine: **MA6 / BA6**
Title: **Bgr. BSA assy. BSA**
Drawing number: **103388** Rev: **01**
Assy. number: **114173** Rev: **01**
Size: A3 Date: 09.10.1995 Sheet 1 of 1
Drawn by: J. Wanning File: 103388R01.sch
KarlSuss



Rev.	Änderung	Datum	Name
	erstellt: 22.06.1995		

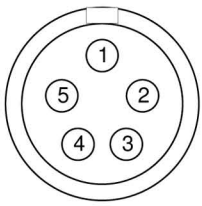
Machine: **MA6/BA6**	Title: **Bgr. Belichtungseinheit** assy. exposure unit		
DrawingNo.: 103394	Rev.: 01	AssemblyNo.: 114169	Rev.: 01
Size : A4_p	Date : 30-Jul-2003	Sheet 1 of 1	
Drawn by: M.Braun	File : 103394R01.SCH	SUSS MicroTec	



Kabel / cable LiY 0.25 :

- br / bn : 146709
- ws / wh : 146413
- ge / ye : 147279
- gr / gy : 146708
- gn / gn : 146414

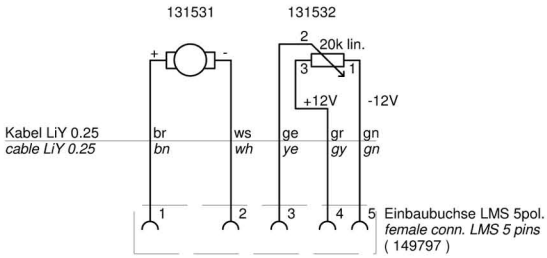
Einbaustecker LMS 5 pol. m. - Ansicht Lötseite
male conn. LMS 5 pins - view solder side



Rev.	Änderung	Datum	Name

Machine: M204/M234		Title: Mikroskop TSA + AL300 - Focus links microscope TSA + AL300 - focus left	
Drawing number: 103571	Rev: 00	Assy. number: 111835	Rev: 00
Size: A4	Date: 11.12.1995	Sheet 1 of 3	
Drawn by: J. Wanning	File: 103571_01R00.sch		

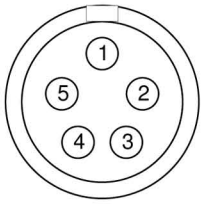
Karl Suss



Kabel / cable LiY 0.25 :

- br / bn : 146709
- ws / wh : 146413
- ge / ye : 147279
- gr / gy : 146708
- gn / gn : 146414

Einbaustecker LMS 5 pol. m. - Ansicht Lötseite
male conn. LMS 5 pins - view solder side

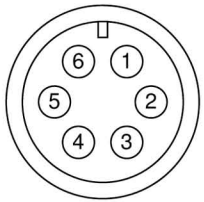


Rev.	Änderung	Datum	Name

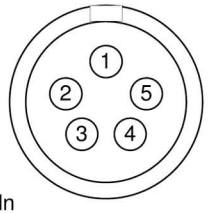
Machine: M204/M234		Title: Mikroskop TSA + AL300 - Focus rechts microscope TSA + AL300 - focus right	
Drawing number: 103571	Rev: 00	Assy. number: 111836	Rev: 00
Size: A4	Date: 11.12.1995	Sheet 2 of 3	
Drawn by: J. Wanning	File: 103571_02R00.sch		

Karl Suss

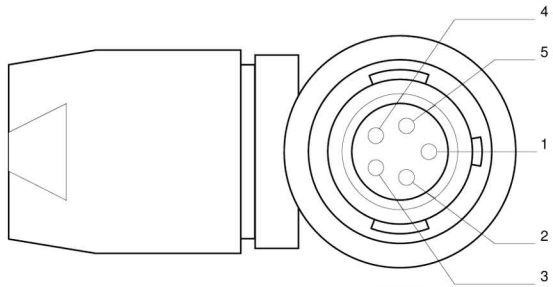
Stiftstecker HIROSE 6pol. - Ansicht Lötseite
male HIROSE connector 6 pins - soldering side view

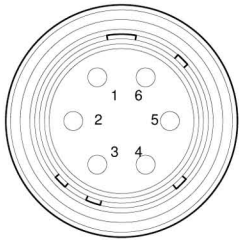


Stiftstecker LEMOSA 5pol. m. - Ansicht Lötseite
female LEMOSA connector 5 pins - soldering side view



Achtung :
Lötanschlüsse der Pins einzeln
mit Schrumpfschlauch isolieren !





Stiftstecker 6pol.
male connector 5 pins
(149902)
HIROSE

Kabel / cable LiYCY 5 x 0.14
(149692)

Stiftstecker 5pol.
male connector 5 pins
(149796)
LEMOSA

2100mm

VCU

1	*Servo 2*	gr	
2	*Servo 3 +12V*	*gy*	gn
3	*Servo 1 -12V*	ge	*gn*
4	*DCM+*	*ye*	ws
5	*DCM-*	br	*wh*
6		*bn*	

TSA-Mikroskop
TSA microscope

Schirm
shield
unter Klammer einklemmen !

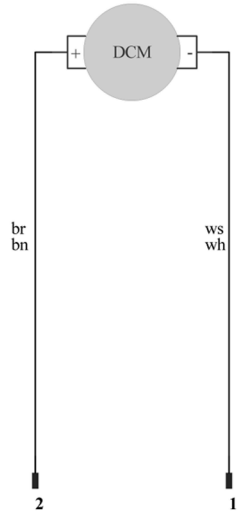
Schirm
shield
nicht anschließen, sondern isolieren !

Rev.	Änderung	Datum	Name
01	Montage Abschirmung		

Machine: MA6/BA6
Title: Kabelsatz TSA Focus rechts/links - AL300
cable set tsa focus right/left - AL300
Drawing number: 103373
Rev: 01
Assy. number: 114054
Rev: 00
Size: A4
Date: 29.11.1995
Sheet 1 of 1
Drawn by: J. Wanning
File:103373R01.sch

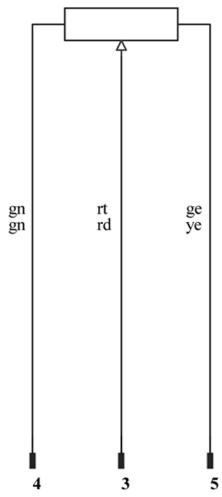
Karl Suss

DCM Focus right
(168027)

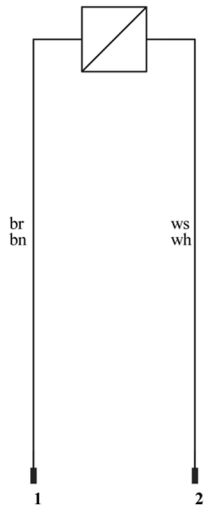


Einbaustecker 5pol.
male receptacle 5pins
(160291)

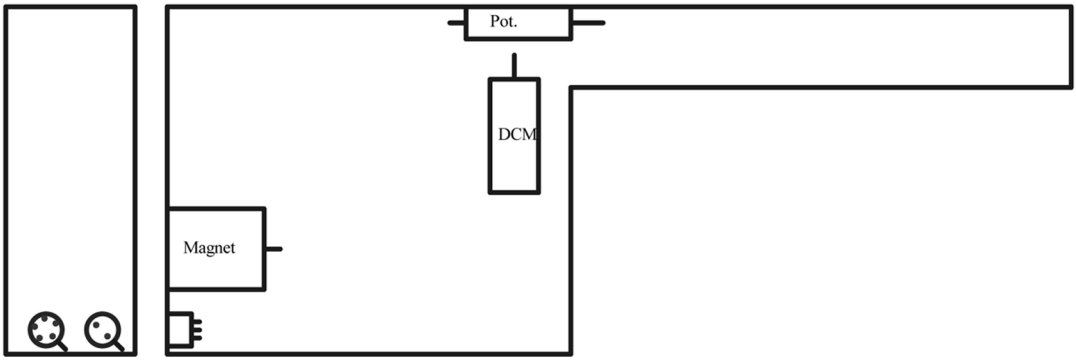
Pot. Focus right
(142133)



Vergrößerung / magnification
(149922)



Einbaustecker 2pol.
male receptacle 2pins
(160290)



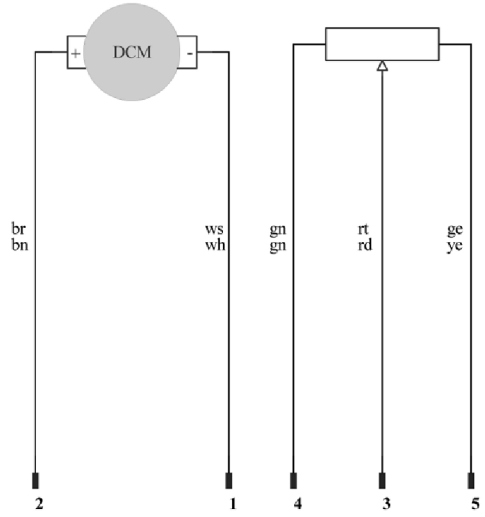
Einbaulage der Stecker
position of receptacles

Rev.			
01	DCM neu	17.04.2000	M.Hoppe
Rev.	Änderung	Datum	Name

Machine: MA/BA6		Title: Unterseitenmikroskop rechts backside microscope right	
Drawing number: 162968	Rev: 01	Assy. number: 159309	Rev: 01
Size: A4	Date: 01.04.1998	Sheet 1 of 1	
Drawn by: M .Hoppe	File: 162968R00.sch		

KarlSuss

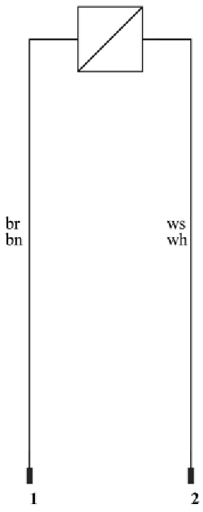
DCM Focus left
(168027)



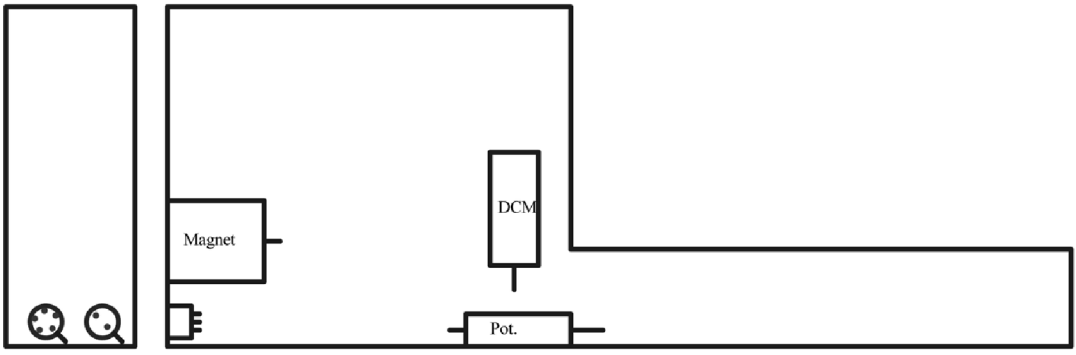
Einbaustecker 5pol.
male receptacle 5pins
(160291)

Pot. Focus left
(142133)

Vergrößerung / magnification
(149922)



Einbaustecker 2pol.
male receptacle 2pins
(160290)

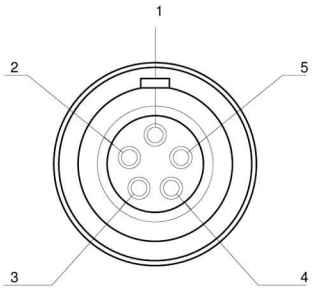


Einbaulage der Stecker
position of receptacles

Rev.	Änderung	Datum	Name
01	DCM neu	17.04.2000	M. Hoppe

Machine: MA/BA6		Title: Unterseitenmikroskop links backside microscope left	
Drawing number: 162969	Rev: 01	Assy. number: 159308	Rev: 01
Size: A4	Date: 01.04.1998	Sheet 1 of 1	
Drawn by: M .Hoppe	File: 162969R00.sch		

Karl Suss

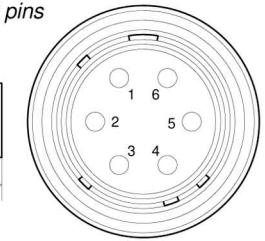


Buchsenstecker 5pol.
female connector 5 pins
(144686)
LEMOSA

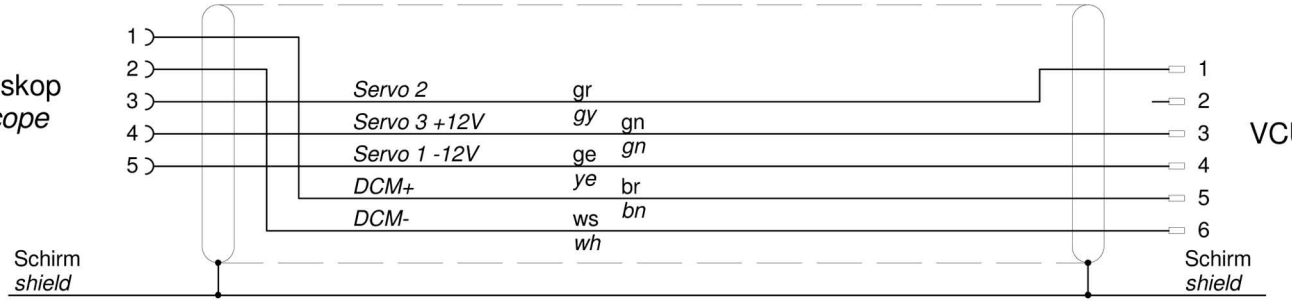
Kabel / cable LiYCY 5 x 0.14
(149692)

1500mm

Stiftstecker 6pol.
male connector 6 pins
(149902)
HIROSE



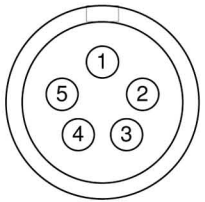
BSA - Mikroskop
bsa microscope



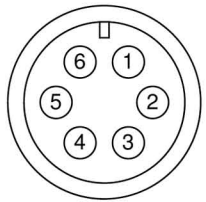
nicht anschließen, isolieren !

unter Klammer einklemmen !

Stiftstecker LEMOSA 5pol. m. - Ansicht Lötseite
female LEMOSA connector 5 pins - soldering side view



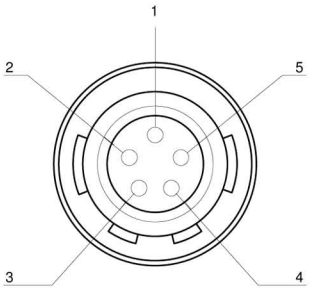
Buchsenstecker HIROSE 6pol. - Ansicht Lötseite
female HIROSE connector 6 pins - soldering side view



Achtung :
Lötanschlüsse der Pins einzeln
mit Schrumpfschlauch isolieren !

Rev.	Änderung	Datum	Name
05	diverse	14.10.1997	Kü
04	nur noch 1 kabel je Seit	27.08.1996	Kü
03	1195		Kü
02	12/94		Mi
01	07/94		Kü

Machine: **MA6/BA6**
Title: Anschlußkabel BSA Focus rechts/links AL300
cable bsa focus right/left AL300
Drawing number: **103468** Rev: **05**
Assy. number: **114053** Rev: **04**
Size: A4 Date: 28.11.1995 Sheet 1 of 1
Drawn by: J. Wanning File:103468R05.sch
Karl Suss

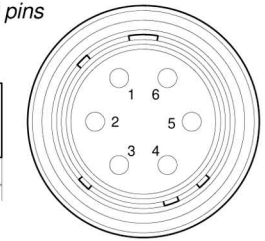


Buchsenstecker 5pol.
female connector 5 pins
(160186)
LEMOSA FGJ-OB-305-CLLD-52

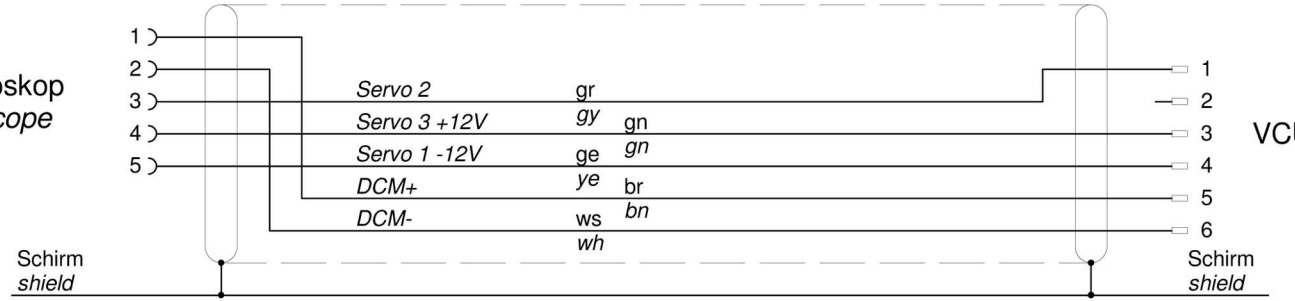
Kabel / cable LiYCY 5 x 0.14
(149692)

1500mm

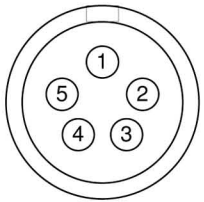
Stiftstecker 6pol.
male connector 6 pins
(149902)
HIROSE



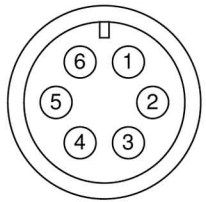
BSA - Mikroskop
bsa microscope



Stiftstecker LEMOSA 5pol. m. - Ansicht Lötseite
female LEMOSA connector 5 pins - soldering side view



Buchsenstecker HIROSE 6pol. - Ansicht Lötseite
female HIROSE connector 6 pins - soldering side view

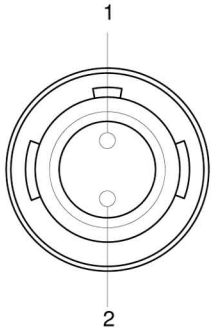


Achtung :
Lötanschlüsse der Pins einzeln
mit Schrumpfschlauch isolieren !

Rev.			
Änderung			
Datum			
Name			
Drawn by:	J. Wanning	Size:	A4
Date:	14.10.1997	Drawing number:	160707
File:	ba\160707\rev00.sch	Sheet	1 of 1
Machine:	MA6/BA6	Rev:	00
Title:	Anschlußkabel BSA Focus rechts/links AL400 cable bsa focus right/left AL400	Assy. number:	160209
		Rev:	00

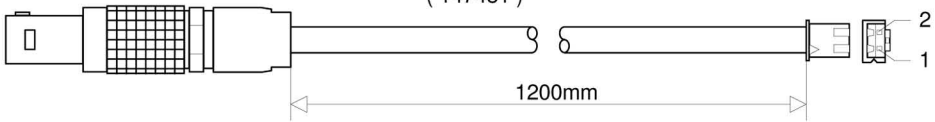
SUSS MicroTec Karl Suss

Buchsenstecker 2pol.
female connector 2 pins
(158946)
LEMOSA FGJ-OB-302-CLLD-42



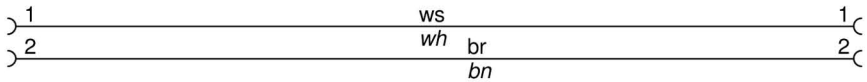
Buchsenstecker IST 2pol.
female IST connector 2 pins
(Gehäuse / housing : 149902)
(Kontaktschuhe / contact shoes : 2 x 149200)

Kabel / cable LiYY 2 x 0.25
(147481)



P36/P37

BSA-Mikroskop



Verteilerplatine

Rev.	Änderung	Datum	Name		
01	Pinbelegung geändert	29.07.03	M.Braun		

Machine: **MA6/BA6**
Title: Anschlußkabel Umsch. Vergr. BSA rechts/links
cable for magnification choice bsa right/left
Drawing number: **160708** Rev: **01**
Assy. number: **160210** Rev: **00**
Size: A4 | Date: 15.10.1997 | Sheet 1 of 1
Drawn by: J. Wanning | File: 160708R00.sch
Karl Suss

D-SUB Stiftleiste 25-polig 146250

Gehäuse für D-SUB 146279

4 Kabel 0,7m 5x0,14 abgeschirmt 149692

4 x Kabeldose 6-polig 150084

Beschriftung:

M +	:1	gr	ws	:1	Servo Signal
M - / GND	:2	br	br	:2	M - / GND
+ 12V	:3	gn	gn	:3	+ 12V
Servo Signal	:4	ws	ge	:4	GND / - 12V
GND / - 12V	:5	ge	gr	:5	M +
				:6	M - / GND

BSA Left

Abschirmung

M +	:6	gr	ws	:1	Servo Signal
M - / GND	:7	br	br	:2	M - / GND
+ 12V	:8	gn	gn	:3	+ 12V
Servo Signal	:9	ws	ge	:4	GND / - 12V
GND / - 12V	:10	ge	gr	:5	M +
				:6	M - / GND

BSA Right

Abschirmung

M +	:11	gr	ws	:1	Servo Signal
M - / GND	:12	br	br	:2	M - / GND
+ 12V	:13	gn	gn	:3	+ 12V
Servo Signal	:14	ws	ge	:4	GND / - 12V
GND / - 12V	:15	ge	gr	:5	M +
				:6	M - / GND

TSA Left

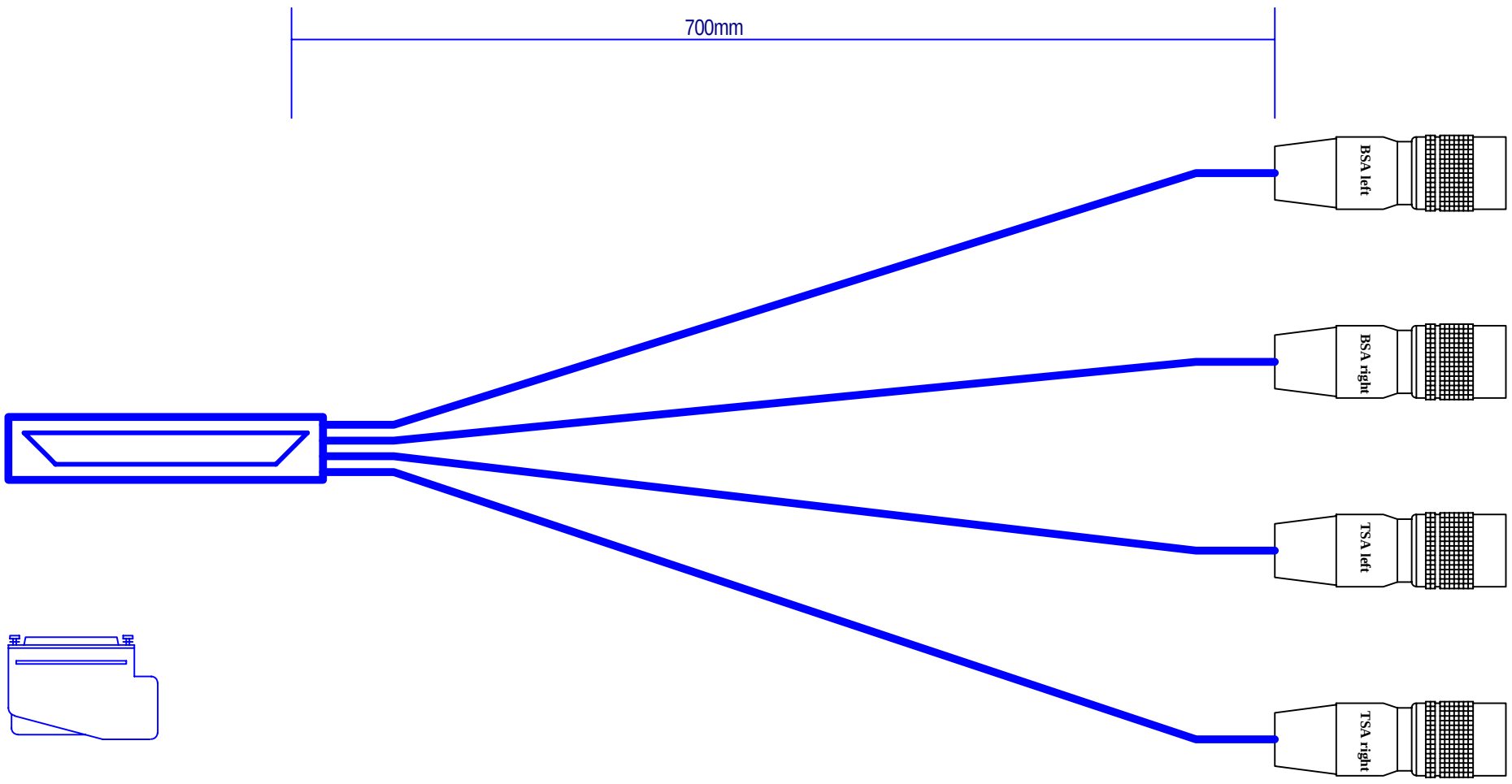
Abschirmung

M +	:16	gr	ws	:1	Servo Signal
M - / GND	:17	br	br	:2	M - / GND
+ 12V	:18	gn	gn	:3	+ 12V
Servo Signal	:19	ws	ge	:4	GND / - 12V
GND / - 12V	:20	ge	gr	:5	M +
				:6	M - / GND

TSA Right

Abschirmung

GND	:21	sw
GND	:22	sw
GND	:23	sw
GND	:24	sw
NC	:25	



Rev.	Änderung	Datum	Name
03	Kabel Ansicht	26.11.01	J.Lauer
02	Beschriftung und Gehäuse	01.10.01	J.Lauer
01	gn+ge in Sub-D getauscht	25.09.01	J.Lauer

Machine: MA/BA6

Title: Focus Control Mic. Adapter

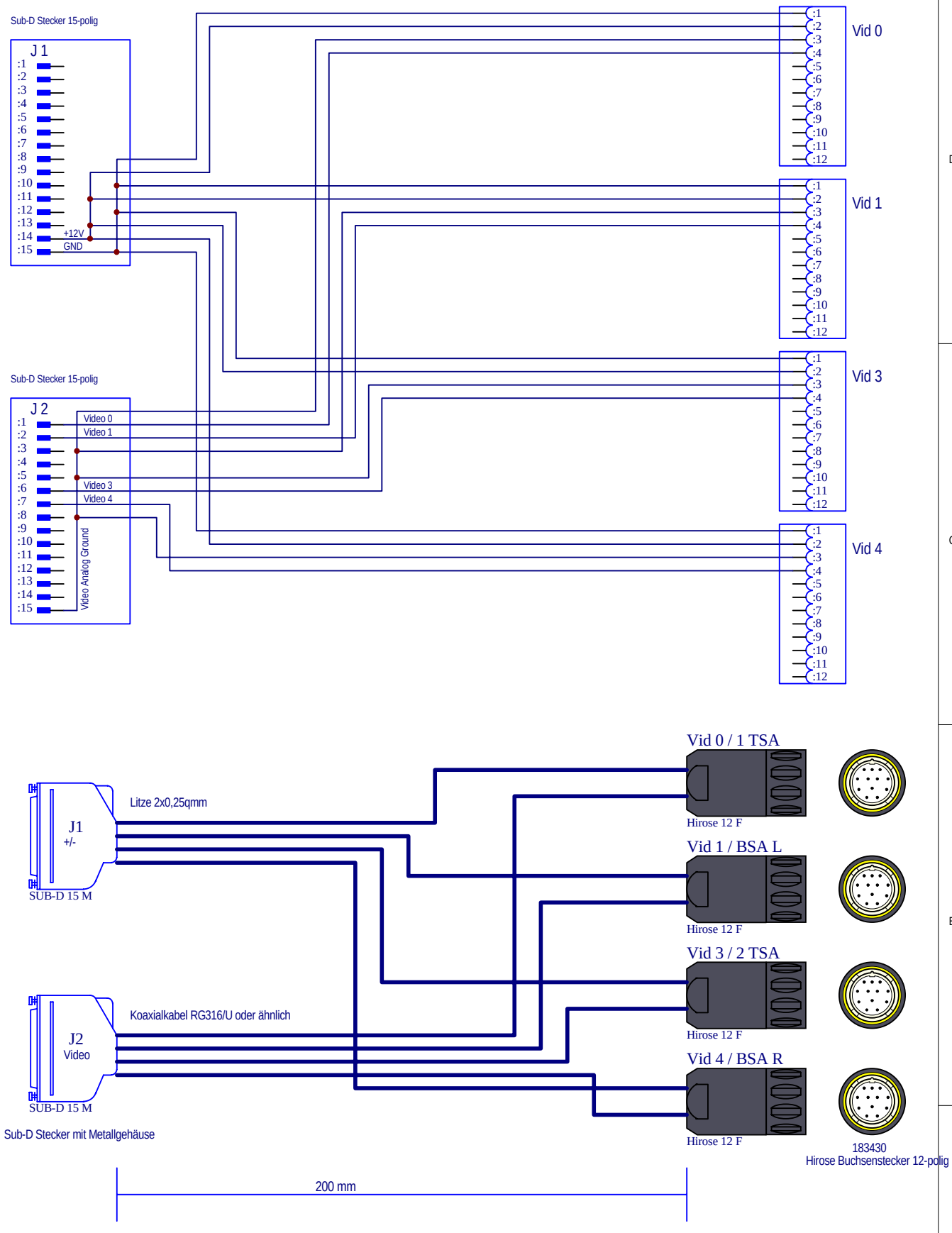
Focus Control Mic. Adapter

DrawingNo.: 181743 Rev.: 03 AssemblyNo.: 181729 Rev.: 00

Size : A3_p Date : 27-Nov-2001 Sheet 1 of 1

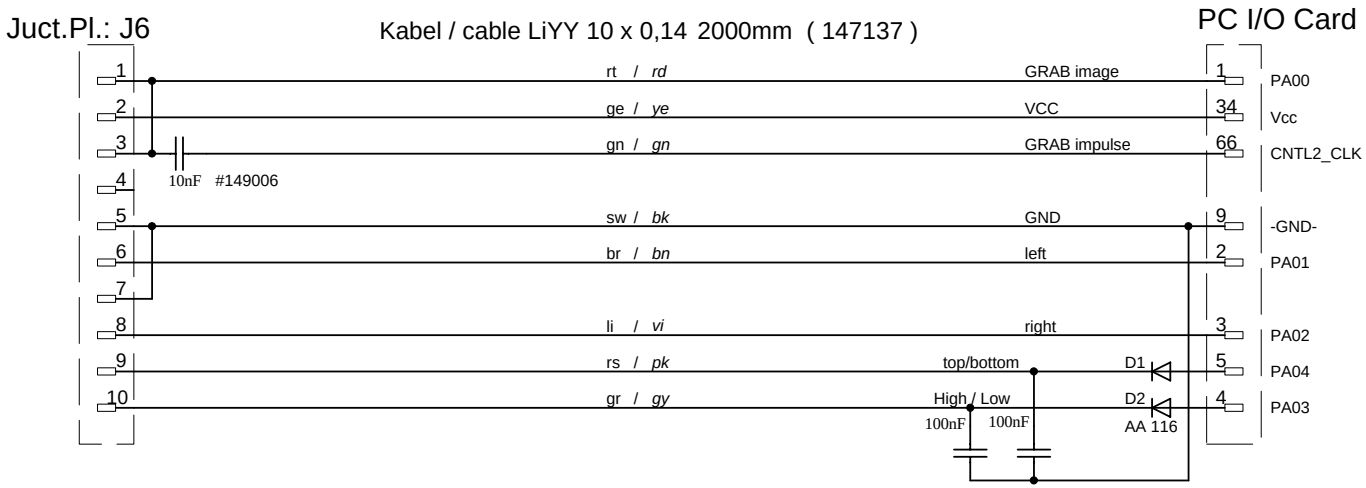
Drawn by: J.Lauer File : 181743R03.SCH

SUSS MicroTec

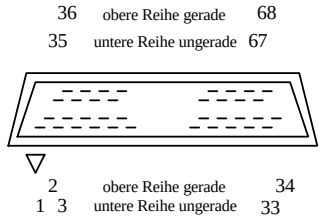


Rev.	Änderung	Datum	Name

Machine: MA/BA6 MA8	Title: Framegrabber Adapterkabel für DT3132 framegrabber adapter cable for DT3132		
DrawingNo.: 182456	Rev.: 00	AssemblyNo.: 181719	Rev.: 00
Size : A4_p	Date : 27-Nov-2001	Sheet 1 of 1	
Drawn by: J.Lauer	File : 182456R00.Sch	SUSS MicroTec	



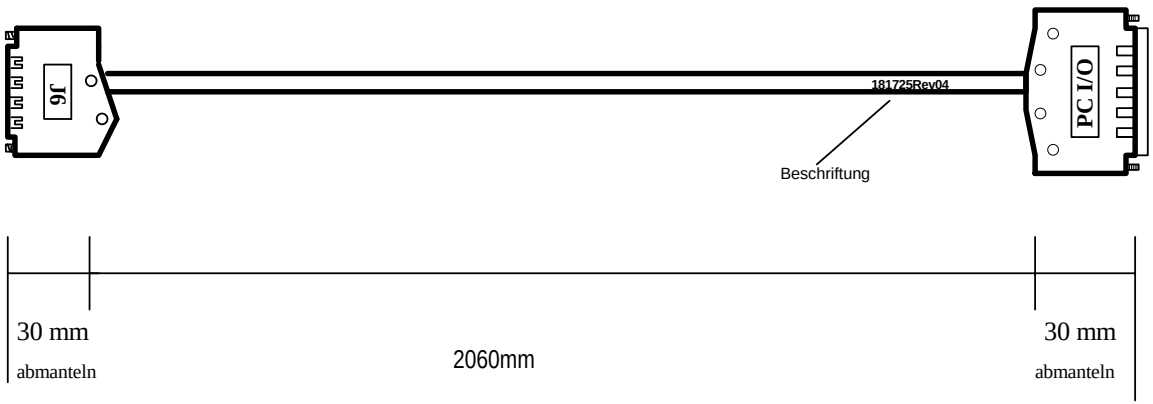
Lötseitenansicht



Stiftleiste D-Sub 15pol.
male D-SUB conn.15 pins
(146695)

Gehäuse / *housing*
(149850)

Verr.-Bolzen / *screws*
(149968)



Stiftleiste SCSI 68pol.
male SCSI conn. 68 pins
(170312)
Gehäuse / housing : (170311)

Diode AA116 / diode : 2 x (146506)
Kondensator / capacitor : 2 x (149119)

Rev.	Änderung	Datum	Name
04	Kondensator 10nF hinzu	26.01.06	M.Hoppe
03	Länge zum Abmanteln hinzu	14.07.03	mab
02	Steckeransicht hinzu	02.06.03	mab
01	Kabel Ansicht	26.11.01	J.Lauer
	erstellt 27.09.2001		

Machine: MA/BA6

Title: EVS MA/BA6 DATA EXCHANGE
EVS MA/BA6 DATA EXCHANGE

DrawingNo.: 181741 | Rev.: 04 | AssemblyNo.: 181725 | Rev.: 00

Size : A4_l | Date : 26-Jan-2006 | Sheet 1 of 1

Drawn by: J.Lauer | File : .DOC_FILE_NAME_no_path

Error : \\Au gn Explorer 99 SE\Sys

SÜSS MicroTec

3.7 Service Information

3.7.1 Subassemblies: MA8; MA6; MA6/BA6; BA6; MA6/BA6-ISA; [M]otorized stage; NFH

Subassembly - Item	Subassembly - Prefix #
Alignment Stage	1
Front Panel	2
Keyboard / Handrest	3
Base Plate	4
Pneumatic	5
BSA Microscope	6
BSA Control Unit	7
TSA Microscope	8
Exposure Unit	9

The respective first number of the following subassemblies refers to the above listed subassembly unit.

3.7.2 Overview for Valves, Throttles, Sensors, etc.

Valves (V)

#	Medium	Function
V 1.1	N_2	Nitrogen under wafer (Hardcontact + *Vac. Contact*)
V 1.2	N_2	Nitrogen under wafer (Release after exposure)
V 1.3	V	Wafer vacuum (Chuck)
V 1.4	N_2	Vacuum reduction (Chuck)
V 1.5	N_2	Nitrogen purge to break vacuum inside chamber after exposure
V 1.6	N_2	Nitrogen pressure regulates vacuum level inside chamber
V 1.7	V	Prevacuum vacuum chamber
V 1.8	V	Main vacuum vacuum chamber
V 1.9	N_2	Inflatable rubber seal (vacuum seal)
V 1.10	V	Vacuum clamp chuck to WEC-head
V 1.11	P	WEC-break
V 1.12	V	Chuck waferload pins down (BA only)
V 1.13	P	Chuck waferload pins up (BA only)
V 1.14	V	Transport slide wafer vacuum
V 1.15	P	Transport slide clamping
V 1.16	P	Proximity rotary actuator open (BA only)
V 1.17	P	Maskholder clamping / Proximity rotary actuator close (BA only)
V 1.18	P	Substrate clamping rotary act. Open (BA only)
V 1.19	P	Substrate clamping rotary act. Close (BA only)
V 1.20	P	Bond fixture clamping (BA only)
V 1.21	V	Bond fixture wafer vacuum (BA only)
V 1.22	N_2	Nitrogen purge to break wafer vacuum (BA only)
V 1.23	P	Proximity flags Maskholder
V 1.24	V	Mask vacuum
V 1.25	P	Bondadapter z-motion up (BA only)
V 1.26	P	Bondadapter z-motion down (BA only)
V 1.27	*P*	*Chuck supporting moveable fingers (for ISA only)*
V 1.28 A+B	*N_2*	*Chamber purge negative resist*
V 1.29	*N_2*	*Purge Maskholder*
V 1.30	*N_2*	*N_2-Lance Purge, substrate separation*
V 1.31	*V*	*Vacuum maskblank*
V 1.32	*V*	*Vacuum chamber for chamber purge negative resist*
V 8.1	P	TSA-microscope up

#	Medium	Function
V 8.2	P	TSA-microscope down
V 8.3	P	TSA-microscope clamping
V 9.1	P	Exposure shutter opener
V 9.2	P	Exposure shutter closer
V 9.3	P	Exposure unit clamping
V 9.4	P	Mirror house forward
V 9.5	P	Mirror house backward

Throttles (T / TO)

#	Function
T 1.1	Nitrogen pressure for hardcontact
T 1.1.1	Nitrogen flow for hardcontact
T 1.2	Nitrogen purge to break vacuum under the wafer
T 1.4	Nitrogen flow to control vacuumlevel under the wafer
T 1.5	Nitrogen pressure to purge vacuum chamber
T 1.5.1	Nitrogen bleed to atmosphere when vac. Chamber is released
T 1.6	Nitrogen flow to control vacuum level inside vacuum chamber
TO 1.7	Determines vacuum flow for prevacuum when vac. Contact
T 1.11	Determines speed to release WEC breaks
TO 1.11.1	*Determines speed to build up adjustable WEC pressure*
T 1.13	Controls speed of waferload pins
TO 1.15	Controls speed of transport slide clamp
TO 1.16	Controls proximity rotary actuator close
TO 1.17	Controls proximity rotary actuator open/ maskholderclamping
TO 1.18	Controls speed of substrate clamping rotary actuator close
TO 1.19	Controls speed of substrate clamping rotary actuator open
T 1.20	Controls speed of bond fixture clamping
T 1.22	Nitrogen flow to release wafer of the bond fixture vacuum
T 1.23	Controls speed of prox. Flags motion out
TO 1.23	Controls speed of prox. Flags motion in
TO 1.25	Controls speed of bond adapter motion down
TO 1.26	Controls speed of bond adapter motion up
T 1.27	*Chuck supporting moveable fingers (for ISA only)*
T 1.28	*Controls purge flow for chamber purge negative resist*
T 1.28.1	*Controls purge pressure for chamber purge negative resist*
T 1.29	*Controls N_2-Purge in MH*

#	Function
T 1.32	*Controls vacuum for chamber purge negative resist*
TO 8.1	Controls speed of microscope motion down
TO 8.2	Controls speed of microscope motion up
TO 8.3	Controls speed of microscope clamping
T 9.1	Controls speed of exposure shutter 1 close
TO 9.1	Controls speed of exposure shutter 1 open
T 9.2	Controls speed of exposure shutter 2 open
TO 9.2	Controls speed of exposure shutter 2 close
TO 9.4	Controls speed of mirror house motion backward
TO 9.5	Controls speed of mirror house motion forward
T 9.6	Controls nitrogen flow for shutter cooling
T 9.8	Controls nitrogen flow for cold light mirror (1000 W)
T 9.8.1	Controls nitrogen flow for upper lamp socket (1000W)
T 9.9	Controls flow for heat sink
OV 8.2	Reduces pressure variation for microscope
OV 1.13	*For N_2-Purge in chuck option*

Sensors (S)

#	Function
S 1.1	Chuck middle position left [M]: Chuck X left end-pos.
S 1.2	Chuck middle position right [M]: Chuck X right endpos.
S1.3	Transport slide front
S1.4	Transport slide back
S 1.5	Maskholder is present, Maskholderdefinition contact
S 1.6	LED OFF: Maskholder definition proximity
S 1.7	Adapter plate fixture
S 1.8	Adaption maskholder
S 1.9	Z-axis down (home position)
S 1.10	Z-axis up (wedge error compensation)
S 1.11	Chuck rotation
S 1.12	Chuck movement in X ±3 mm [M]: Chuck X reference middle pos.
S 1.13	Chuck middle position front [M]: Chuck Y front endpos.
S 1.14	Chuck middle position rear [M]: Chuck Y rear endpos.

#	Function
S 1.15	Chuck movement in Y ±3 mm [M]: Chuck Y reference (middle) pos.
S 1.16	*Chuck identification (for ISA only)* *[M]: Chuck rotation right endpos.*
S 1.17	[M]: Chuck rotation reference (middle) pos.
S 1.18	[M]: Chuck rotation left endpos.
S 1.19	*Knife exists and connected (Embossing-Option)*
S 1.20	*Separation Knife reference Y-direction (Embossing-Option)*
S 1.21	*Separation Knife reference Z-direction (Embossing-Option)*
S 6.1	BSA-microscope x-end limit left and reference sensor
S 6.2	BSA-microscope y-end limit left and reference sensor
S 6.3	BSA-microscope x-end limit right and reference sensor
S 6.4	BSA-microscope y-end limit right and reference sensor
S 8.1	TSA-microscope z-down
S 8.2	TSA-microscope z-up
S 8.3	TSA-microscope x-endlimit
S 8.4	TSA-microscope x-centre
S 8.5	TSA-microscope y-endlimit
S 8.6	TSA-microscope y-centre
S 8.7	*TSA-microscope Theta left (motorized TSA only)*
S 8.8	*TSA-microscope Theta right (motorized TSA only)*
S 9.1	Mirror house forward
S 9.2	Mirror house backward
S 9.3	Exposure system forward
S 9.4	Exposure system backward
S 9.5	Lamp house position left/right (MA8 only) (sensor ON = LH at right side)
S10.1	*NFH in expose position*
S10.2	*NFH in parking position*

Motors (DCM)

#	Function
DCM 1.1	Z-axis
DCM 6.1	BSA-microscope x-left
DCM 6.2	BSA-microscope y-left
DCM 6.3	BSA-microscope x-right
DCM 6.4	BSA-microscope y-right
DCM 8.1	TSA-Microscope X

#	Function
DCM 8.2	TSA-Microscope Y
DCM Y	*Separation motor Y-direction (Embossing-Option)*
DCM Z	*Separation motor Z-direction (Embossing-Option)*

Pressure Regulators (PR)

#	Function	
PR 1.13	Wafer loading pins	(PN 151085)
PR 1.9	Inflatable rubber seal	
PR 5.1	Main air pressure	(PN 150917)
PR 5.2	Main nitrogen pressure	(PN 150917)
PR 5.3	Wedge error compensation (WEC) head pressure	
PR 5.11	*Adjustable WEC-pressure*	*(PN 151519)*
PR 5.30	*N_2-Purge for substrate separation*	

Gauges (PD)

#	Function
PD 1.8	Vacuum chamber
PD 1.9	Inflatable rubber seal
PD 5.1	Main air pressure
PD 5.2	Main nitrogen pressure
PD 5.3	Wedge error compensation (WEC) head pressure
PD 5.4	Main vacuum

Vacuum/Pressure Sensors (CV)

#	Medium	Function
CV 1.1	V	Wafer vacuum (sensor ON = vac. O.K.)
CV 1.2	V	Mask vacuum (sensor ON = vac. O.K.)
CV 1.3	V	Vacuum fixture upper substrate (sensor ON = vac. O.K.)
CV 5.1	P	Machine main air pressure (at Input pcb LED OFF = Pressure O.K.)
CV 5.2	N_2	Machine main nitrogen pressure (at Input pcb LED OFF = Pressure O.K.)
CV 9.7	N_2	Nitrogen cooling flow to lamp socket (sensor ON = cooling O.K.)

(CV - MUPS-1K PN: 151203)

Flow Meter (F)

#	Function
F 9.7	Lower Lamp socket cooling

Potentiomater (PT)

#	Function
PT 2.1	Upper Substrate LEFT
PT 2.2	Upper Substrate RIGHT
PT 2.3	Lower Substrate LEFT
PT 2.4	Lower Substrate RIGHT
PT 2.5	Illumination LEFT
PT 2.6	Illumination RIGHT
PT 2.7	Illumination microscope

Switches (SW)

#	Function
SW 2.1	Main switch
SW 2.2	Emergency switch
SW 2.3	Split field-switch
SW 2.4	BSA / IR-illumination

PC Board Designation

BOARD	MANUAL ALIGNMENT STAGE	MOTORIZED ALIGNMENT STAGE
C1	Controller (CPU)	Controller (CPU)
C2 / C3	Input	Input
C4 / C5	Output / Valve Driver	Output / Valve Driver
C6	DC Motor Control (Z-axis)	DC Motor Control (Z-axis and TSA)
C7	DC Motor Control (TSA Scope Stage X/Y)	X,Y- Alignmnet Stage *(Y,Z-Separation)*
C8	DC Motor Control (BSA left X/Y)	DC Motor Control (BSA left/right X/Y)
C9	DC Motor Control (BSA right X/Y)	Joysticks RS232 extern
C10	Input optional	MA8 ; MA6 with mot. TSA rotation
C11	Exposure Light Integrator or Focus Control EISS	Light Integrator or Focus Control EISS

RESET-STEPS

1. TSA Y-axis
2. TSA X-axis
3. Stage Z-axis
4. BSA X-Y-axis
   (Y-left, Y-right, wait for S6.2 + S6.4, X-left, X-right, wait for S6.1 + S6.3, move to default position)
5. Motorized alignment stage if applicable / *(Separation Knife if applicable)*
6. Main Menue

SERVICE PROGRAM LEVEL

WARNING! ONLY FOR SKILLED STAFF

Press ALIGN/CONT/EXP-key simultaneous to switching on machine!

1. VALVE TEST
2. INPUT TEST
3. LED TEST
4. SET GRAB Z POSITION
5. TSA STAGE
6. BSA STAGE
7. ALIGNMENT STAGE
8. HEIDENHAIN
9. I/O Test (with special equipment only)

Reset the machine: press FAST key first and then UNLOAD key second within 200 ms.

LED Designation Input & Output boards

Input board C2			
S 6.4	S 8.2	S 1.8	7
S 6.2	S 8.1	S 1.7	6
S 6.3	S 9.4	S 1.6	5
S 6.1	S 9.3	S 1.5	4
S 8.6	S 9.2	S 1.4	3
S 8.5	S 9.1	S 1.3	2
S 8.4	S 1.10	S 1.2	1
S 8.3	S 1.9	S 1.1	0
C	B	A	

Input board C3		
Reserved *Laser interlock LPB*	S 1.18 *S 1.21*	Reserved
Reserved *Laser ready LPB*	S 1.17 *S 1.20*	Reserved *Wait for supply LPB*
CV 1.3	S 9.5 or S 1.16 *S 1.19*	Reserved *Laser error LPB*
CV 9.7	S 1.15	Reserved
CV 1.2	S 1.14	← SW 3.4
CV 1.1	S 1.13	→ SW 3.3
CV 5.2	S 1.12	↓ SW 3.2
CV 5.1	S 1.11	↑ SW 3.1
C	B	A

Output board C4		
V 9.3	V 1.17	V 1.8
V 9.2	V 1.16	V 1.7
V 9.1	V 1.15	V 1.6
V 1.23	V 1.14	V 1.5
V 1.21	V 1.12	V 1.4
V 1.20	V 1.11	V 1.3
V 1.19	V 1.10	V 1.2
V 1.18	V 1.9	V 1.1

Output board C5		
LED joystick left	*Reserved Laser gate on/off LPB*	V 9.5
LED Joystick middle	*Reserved Laser enable LPB*	V 9.4
LED Joystick right	LCD relay (-Q3/200)	V 1.13
Reserved *Switch RS232*	*V 1.32*	V 1.22
Start dispense	Contact LED	V 8.3
N_2 Lance V1.30	V 1.27 / *V1.28 A+B*	V 8.2
NFH shutter	V 1.26	V 8.1
MH purge V 1.29	V 1.25	V 1.24

Input board C10 ([M]otorized stage, NFH, force sensor, and other *options* only)

	TSA Θ *left S 8.7*	LH 5kW Shut- ter error
	TSA Θ *right S 8.8* *Start Separation Embossing*	NFH S 10.2
	MA8 [M] S 9.5	NFH S 10.1
	Embossing	Force sensor GW 4
	Reserved *Laser Error LPB prepared*	Force sensor GW 3
	Reserved *Laser wait for supply LPB pre- pared*	Force sensor GW 2
	Reserved *Laser Ready LPB prepared*	Force sensor GW 1 (Grenzwert)
	Reserved *Laser interlock LPB prepared*	Force sensor ovf (Overflow)

Input test display

S 1.8	S 1.7	S 1.6	S 1.5		S 1.4	S 1.3	S 1.2	S 1.1	C2a	C3a				S 8.7		SW 3.4	SW 3.3	SW 3.2	SW 3.1
S 8.2	S 8.1	S 9.4	S 9.3		S 9.2	S 9.1	S 1.10	S 1.9	C2b	C3b			S 9.5 or S1.16	S 1.15		S 1.14	S 1.13	S 1.12	S 1.11
S 6.4	S 6.2	S 6.3	S 6.1		S 8.6	S 8.5	S 8.4	S 8.3	C2c	C3c			CV 1.3	CV 9.7		CV 1.2	CV 1.1	CV 5.2	CV 5.1
X	X	X	X		X	X	X	X	Actual key	DIP switch									
↓	↓	↓	↓		↓	↓	↓	↓			8	7	6	5		4	3	2	1

0	0	0	0		0	0	0	0	SEP. ∧
0	0	0	0		0	0	0	1	SEP. ∨
0	0	0	0		0	0	1	0	FAST
0	0	0	0		0	0	1	1	LOAD
0	0	0	0		0	1	0	0	UNLOAD
0	0	0	1		0	1	0	0	PRE-BOND
0	0	0	1		0	1	1	1	EXPOSURE
0	0	0	1		1	0	0	0	F1
0	0	0	1		1	0	0	1	CHANGE MASK
0	0	0	1		1	0	1	0	LAMP TEST
0	0	0	0		1	1	1	1	PERFORM CLAMPING
0	0	0	1		0	0	0	0	ALIGNMENT CHECK
0	0	0	1		0	0	0	1	SELECT PROGRAM
0	0	0	1		0	0	1	0	EDIT PROGRAM
0	0	0	1		0	0	1	1	EDIT PARAMETER
0	0	0	0		1	0	1	0	OPTION
0	0	0	0		1	0	1	1	MULTIPLE EXPOSURE
0	0	0	0		1	1	0	0	SCAN
0	0	0	0		1	1	0	1	SET REFERENCE
0	0	0	0		1	1	1	0	ENTER
0	0	0	0		0	1	0	1	BSA MICROSCOPE
0	0	0	0		0	1	1	0	LEFT
0	0	0	0		0	1	1	1	BOTH
0	0	0	0		1	0	0	0	RIGHT
0	0	0	0		1	0	0	1	TOP BOTTOM
0	0	0	1		0	1	1	0	GRAB IMAGE